



INSTRUCTION MANUAL

1125

Parallel – Storage Unit

A

GENERAL RADIO



Contents

SPECIFICATIONS
CONDENSED OPERATING INSTRUCTIONS
INTRODUCTION—SECTION 1
INSTALLATION—SECTION 2
OPERATING PROCEDURES—SECTION 3
PRINCIPLES OF OPERATION—SECTION 4
SERVICE AND MAINTENANCE—SECTION 5
PARTS LISTS AND DIAGRAMS—SECTION 6

WARRANTY

We warrant that each new instrument manufactured and sold by us is free from defects in material and workmanship, and that, properly used, it will perform in full accordance with applicable specifications for a period of two years after original shipment. Any instrument or component that is found within the two-year period not to meet these standards after examination by our factory, District Office, or authorized repair agency personnel, will be repaired or, at our option, replaced without charge, except for tubes or batteries that have given normal service.

1125

Parallel – Storage Unit

A

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Form 1125-0100-A
October, 1968
ID-B100

Condensed Operating Instructions

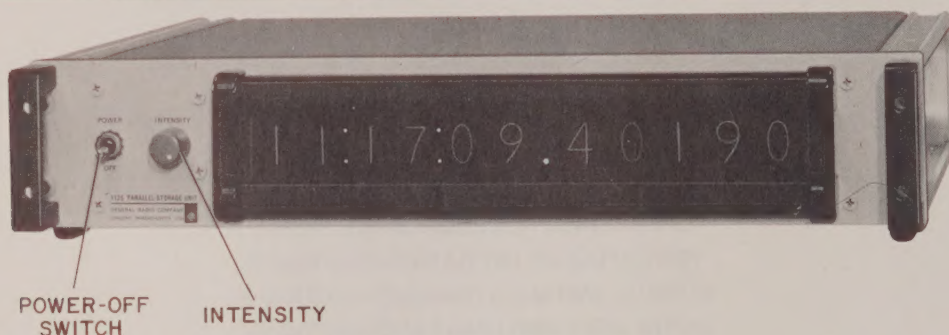


Figure 1-1. Type 1125 Parallel-Storage Unit.

CONDENSED OPERATING INSTRUCTIONS

- Connect a GR 1123 Digital Synchronometer® Time Comparator (BCD 1-2-4-8, see sticker at rear) to the GR 1125 Parallel-Storage Unit as shown in Figure 2-6. The input to the STORE jack and the positions of polarity switches on the 1125 are dependent on the application (Section 3).
- Connect a suitable printer or other digital processing unit to the BCD DATA OUTPUT jack, if desired.
- Set the POWER-OFF switch on the front panel of the 1125 to POWER.
- Adjust the INTENSITY control for the desired lighting of the digits.
- Data will now be stored in the 1125 and displayed on its visual indicators and available at the BCD DATA OUTPUT jack for printing or processing upon receipt of a store command.

NOTE: This instrument is equipped with our new snap-on knob for added convenience and safety. Refer to the Service Section for details.

TRANSFER CHARACTERISTICS

Capacity: 11 decimal digits (44 bits) parallel-entry jam-transfer; 10 μ s resolution.

Transfer Time: 2 μ s approx, for up to 8-ft data cables.

Mode: Data are stored until next store command.

INPUT

Data: 4-line BCD, 1-2-4-8; fully compatible with output of 1-2-4-8 versions of GR 1123 time comparator.

Store Command: Positive or negative transition (switch-selected) between 0 and at least +5 V. Input impedance >100 k Ω , dc coupled.

Inhibit Signal (from 1123): Inhibits transfer while input data are changing.

Inhibit Signal (internal or external): Inhibits transfer while stored data are read by output equipment. Internal inhibit is equal in duration to print command (see below). External inhibit signal can be presence of either 0 or at least +5 V (switch-selected); input impedance >100 k Ω , dc coupled.

OUTPUT

Data: 4-line BCD, 1-2-4-8 with GR 1123.

Logic Levels:

"1" = +10 V

"0" = 0 V

Output Impedance: Approx 6.8 k Ω at logic "1," approx 12 k Ω at logic "0."

Print Command: Pulse of +15 V behind 5 k Ω , duration adjustable 20 ms to 0.5 s; set initially for use with GR 1137 Data Printer.

Data-Ready Signal: Pulse of +15V behind 5 k Ω , 50- μ s duration, occurs 10 μ s after transfer is completed.

Readout: 11 in-line digital indicators. Indicates 10's of hours through 10 μ s.

GENERAL

Power Required: 90 to 130 or 180 to 260 V, 50 to 60 Hz, 25 W.

Accessories Supplied: Data and inhibit signal cables for connection to GR 1123, output data connector, power cord, spare fuses, mounting hardware with rack models.

Accessories Available: GR 1137 Data Printer and other digital-data acquisition instruments.

Mounting: Rack-bench cabinet.

Dimensions (width x height x depth): Bench, 19 x 3 $\frac{3}{8}$ x 17 in. (485 x 99 x 435 mm); rack, 19 x 3 $\frac{1}{2}$ x 16 $\frac{3}{4}$ in. (485 x 89 x 425 mm).

Weight: Net, 23 $\frac{1}{2}$ lb (11 kg); shipping, 45 lb (20 kg).

Catalog Number	Description
1125-9801	1125 Parallel-Storage Unit Bench Model
1125-9811	Rack Model

Introduction—Section 1

1-1	PURPOSE	1-1
1-2	DESCRIPTION	1-1
1-3	CONTROLS AND CONNECTIONS	1-1
1-4	ACCESSORIES SUPPLIED	1-3
1-5	EQUIPMENT REQUIRED	1-3
1-6	ACCESSORIES AVAILABLE	1-3

1.1 PURPOSE.

The 1125 Parallel-Storage Unit (Figure 1-1) is an eleven-decimal-digit storage register that will acquire time-of-day information from the Type 1123 Digital Synchronometer® with BCD 1-2-4-8 code (see sticker at rear) in 2 μ s. When given a transfer command, the 1125 Parallel-Storage Unit stores the clock time in hours, minutes, seconds, etc., down to the nearest 10 μ s, and holds these data until a new command is given. The stored data can be read from the eleven-digit visual register or taken from the BCD data output for transfer to a printer, computer, or other data-processing device. The unit allows precision timing of an event, with data stored for readout or processing by slower devices.

1.2 DESCRIPTION.

1.2.1 General.

The 1125 Parallel-Storage Unit basically consists of a forty-four bit storage register (eleven decimal digits with four binary bits each), an indicator readout, and a program control.

1.2.2 Storage.

The storage registers accept 1-2-4-8 BCD format data from a Type 1123 Digital Synchronometer. When a transfer command is given, the data present at the input terminals is immediately stored in the register, replacing any previous data without any requirement for zero setting. The timing and inhibit signals are provided by the Type 1123 Synchronometer and controlled by the program.

1.2.3 Readout.

The stored data is displayed on eleven Numerik in-line incandescent readout indicators and presented in BCD 1-2-4-8 format at the rear panel BCD DATA OUTPUT connector. The visual register on the front panel is dimmable (INTENSITY switch) and displays the stored time with 10- μ s resolution.

1.2.4 Program.

The program consists of the timing and inhibit controls required to transfer data without interfering with data-processing equipment, which can be using the 1125's data output, and without trying to store new data from the 1123 while its registers are in a state of transition. The 1123 supplies digital data and a 100-kHz inhibit signal to indicate that data is changing. Other inputs to the program are a transfer command that initiates storage of new data and an inhibit command that prevents data storage, if the present data is being used by other equipment. A print command and a data-ready command are provided as outputs to initiate transfer of data to a printer or other device.

1.3 CONTROLS AND CONNECTORS.

The controls and connectors on the rear of the 1125 Parallel-Storage Unit are listed in Table 1-1 and shown in Figure 1-2. Figure 1-1 shows the POWER-OFF and INTENSITY switches located on the front panel.

TABLE 1-1
CONTROLS AND CONNECTORS

Figure 1-2 Reference	Name	Function
1	DATA READY OUTPUT (J154)	BNC jack; output pulse signaling that new data has been stored.
2	PRINT OUTPUT (J156)	BNC jack; print-command output pulse for 1137 Data Printer or equivalent.
3	1, 2, 3	Blank holes with snap buttons. For additional BNC jacks.
4	DATA-0 (0 REF) (J152)	Reference voltage input for DATA-0 that should be jumped to ground for use with the 1123 Synchronometer with 1-2-4-8 BCD data.
5	S0203 (accepts Cinch or Amphenol P/N 57-30140 Multiple Plug.)	Unused 14-pin socket. (For system applications.)
6	BCD DATA OUTPUT (S0202) (Accepts Cinch or Amphenol P/N 57-10500 Multiple Plug.)	50-pin connector for connections to a printer or other output device.
7	Fuse 0.25A (F151)	0.25A slo-blo line fuse for 100-125 V operation.
8	Power-line plug (PL151)	Receives 3-wire line cord to supply ac power to instruments.
9	Line-voltage switch (S152)	Switches instrument from 100-125 V ac operation to 200-250 V ac operation.
10	Fuse 0.125A (F152)	0.125A line fuse for 200-250 V operation.
11	BCD DATA INPUT (S0201) (Accepts Cinch or Amphenol P/N 57-30500 Multiple Plug.)	50-pin connector to receive data from a GR 1123 Synchronometer with 1-2-4-8 BCD data.
12	Shorting link	Shorts DATA-0 to GND when instrument is used with 1123.
13	GND (J153)	Ground terminal for chassis connection.
14	DATA-1 (J151)	Jack to check DATA-1 reference signal level.
15		Blank hole for additional toggle switch (P/N 7910 -0790, -0791, -0810).
16	POS - NEG (S156)	Inhibits storage for applied positive (DATA-1) or negative (DATA-0).
17	INHIBIT (J158)	BNC jack; input from printer or other device to prevent storing new data while printer is operating. (This connection is also made to the BCD DATA OUTPUT connector.)

TABLE 1-1 (cont.)
CONTROLS AND CONNECTORS

Figure Reference	Name	Function
18	INT - EXT (S155)	Allows use of internally generated inhibit (duration of print command) or external inhibit.
19	POS - NEG (S154)	Sets input circuit to store on positive or negative transition of STORE input.
20	STORE (J157)	BNC jack; input for data storage command.
21	POS - NEG (S153)	Sets positive or negative level to control inhibit.
22	100 kHz INPUT (J155)	BNC jack; input for 100 kHz from 1123 to indicate when data is changing.

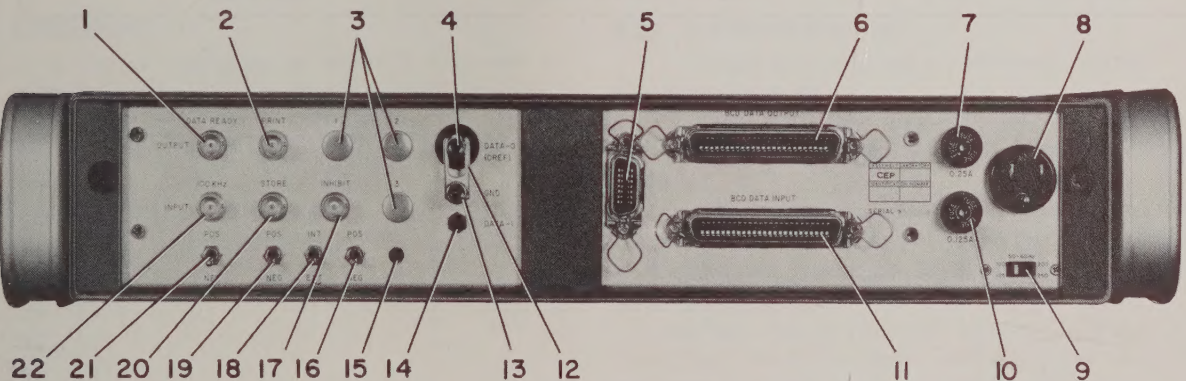


Figure 1-2. Rear panel controls and connectors.

1.4 ACCESSORIES SUPPLIED.

The 1125 Storage Unit comes with the accessories listed in Table 1-2.

1.5 EQUIPMENT REQUIRED.

The 1125 Parallel-Storage Unit cannot be used without certain supporting equipment. A GR Type 1123 Digital Synchronometer with BCD 1-2-4-8 code is required as the time data source. A standard-frequency oscillator is required to drive the 1123 Synchronometer. The GR Type 1115 Standard-Frequency Oscillator is recommended for

a driving source because of its phase coherence between the 1-MHz and 100-kHz signals.

1.6 ACCESSORIES AVAILABLE.

The GR Type 1137 Data Printer is available to make a permanent record of time readings stored in the storage unit (3 prints per second, maximum). Other commercial printers are available if higher speed operation (10-20 prints per second) is desired.

The GR Type 1124 Receiver is available to be used to calibrate the Type 1123 Synchronometer.

TABLE 1-2
ACCESSORIES SUPPLIED

NAME	DESCRIPTION	GR PART NUMBER
POWER CORD FUSE	3-wire 0.125 A, slo-blo	4200-9622 5330-0450 (Equivalent: Buss MDL 1/8, 150 V)
FUSE	0.25 A, slo-blo	5330-0700 (Equivalent: Buss MDL 1/4, 250 V)
CABLE	BCD DATA INPUT Cable Assembly (PL-1 to PL-2)	4205-1060
PATCH CORD	BNC Cord for 100-kHz Connection	8161-1600
MULTIPLE PLUG	50-pin plug to connect to the BCD DATA OUTPUT socket.	4220-3050 (Equivalent: Cinch or Amphenol P/N 57-30500)
END FRAME SET or RACK SUPPORT SET	Used for bench mounting Used for rack mounting	5310-9624 7863-9624

Installation—Section 2

2-1	DIMENSIONS	2-1
2-2	MOUNTING	2-1
2-3	EXTERNAL CONNECTIONS	2-3

2.1 DIMENSIONS.

The over-all dimensions of the 1125 are shown in Figure 2-1.

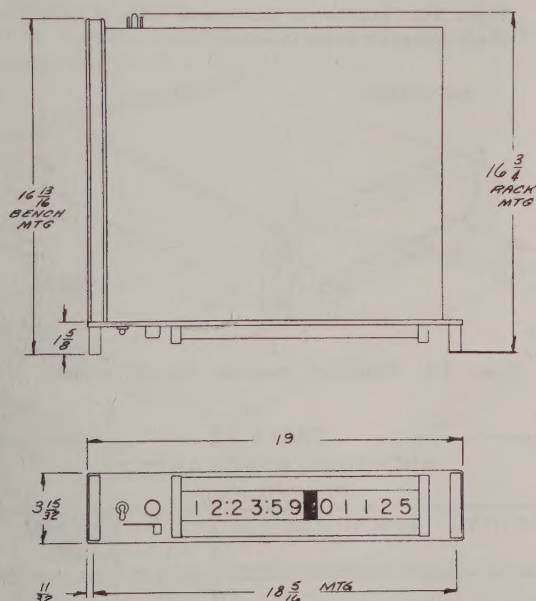


Figure 2-1. Over-all dimensions of the 1125 (inches).

2.2 MOUNTING.

2.2.1 General.

The 1125 Parallel-Storage Unit can be either bench or rack mounted. Bench mounting is accomplished by use of an End-Frame Set (P/N 5310-9624) and rack mounting by use of a Rack-Support Set (P/N 7863-9624). One of these two sets is included with your instrument, the other is available from General Radio.

2.2.2 Rack-Model Mounting.

To install the instrument in a relay rack, use the following procedure:

- Remove the end frames, if they have been previously installed for bench mounting (refer to paragraph 2.2.3).
- Remove the cabinet-to-chassis screws (if any) from the rear panel and slide the instrument out of the cabinet.
- Set the cabinet on its left side, with the front-panel-opening toward the front.
- Place the right-side rack support (A, Figure 2-2) on the right side of the cabinet with the smaller flange forward and flush with the front edge of the cabinet. The bottom of the cabinet must be resting on the long flange.

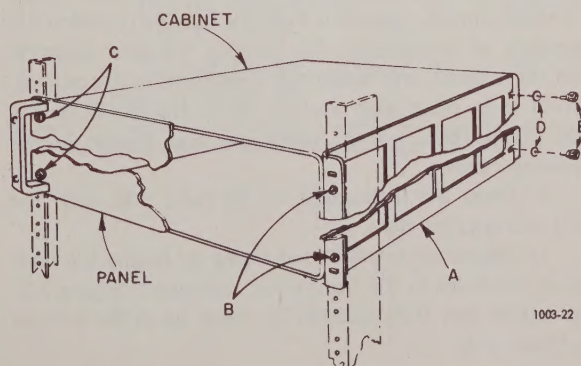


Figure 2-2. Relay-rack mounting.

TABLE 2-1 RELAY-RACK SUPPORTS HARDWARE SET (P/N 7863-3003)			
QUANTITY	DESCRIPTION	FIG. 2-2 REF.	GR PART NO.
2	Screw, Phillips-head, 10-32, 5/8-inch	B	7080-2000
4	Panel screw, Phillips-head, 10-32, 5/8 inch, with cup washer	C	7270-6310
4	Flat washer, 10-32	D	8100-1517
4	Thumbscrew, 10-32, 1/4-inch	E	7270-3800

e. Insert and tighten two thumbscrews (E) with flat washers (D) through the rear holes of the support, into the cabinet, as shown.

f. Turn the cabinet onto its right side and mount the left-side rack support in the same manner.

g. Place the cabinet, with supports attached, in the desired position in the relay rack and lock it in place with two No. 10-32, 5/8-inch screws (B, one on each side). Use the middle hole in the flange.

h. Reinstall the instrument in its cabinet, using the four No. 10-32, 5/8-inch screws (C) with washers.

NOTE

The cabinet-to-chassis screws through the rear panel can now be left out.

To remove the instrument leaving the cabinet in the rack, remove the four panel screws (C) and slide the instrument forward.

To remove the cabinet, with the instrument remaining in the rack, loosen the four thumbscrews (E), two on each side, and slide the cabinet off, to the rear of the rack.

2.2.3 Bench-Model Mounting

To convert the instrument from a relay-rack model to a bench model, remove it from the rack by reversing the procedure of paragraph 2.2.2; remove the rack supports from the cabinet, and install the instrument in the cabinet, locking it in place with the two black No. 10-32 screws (P/N 7098-0160). Next install the end frames in the following manner:

a. Place the instrument on its right side, with the panel facing to the right.

b. Select the left-side end frame by noting the position of the holes in the front ends, as shown in Figure 2-3. The rubber feet (P/N 5260-0710) must be at the bottom (A, Figure 2-4).

c. Place an aluminum notched clamp (B) over each of the four No. 10-32, 3/8-inch screws (C).

d. Attach the end frame to the side of the cabinet by inserting the four screws (C) with clamps, as shown, but do not tighten them down. The cutout portion of the clamp must extend over the ridge of the end frame, with the clamp flat against the cabinet.

e. Install and tighten the panel screws (D) through the panel and into the end frame. (The front of the frame must be tight against the panel.) To do this, insert a screwdriver through the corresponding hole in the handle.

f. Tighten the four screws (C).

g. Turn the instrument over carefully, so that it rests on the newly installed end frame, with the panel facing to the left. Repeat steps b through f for the right-side end frame.

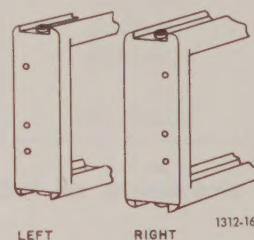


Figure 2-3. Position of panel-screw holes in front of end frames for bench mounting.

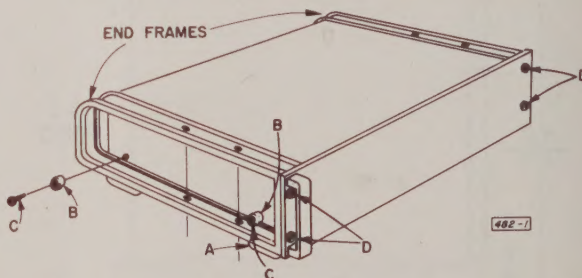


Figure 2-4. Method of mounting the end frames.

TABLE 2-2 END-FRAME HARDWARE SET (P/N 5310-3302)			
QUANTITY	DESCRIPTION	FIG. 2-4 REF.	GR PART NO.
8	Clamp, aluminum	B	5310-6310
8	Screw, Phillips-head, 10-32, 3/8-inch	C	7080-1000
4	Panel screw, Phillips-head, 10-32, 5/8-inch, with nylon cup washer	D	7270-6210

Removal of the cabinet-to-chassis screws from the rear panel now permits the instrument to be removed from the cabinet without detaching the end frames. Simply remove the panel screws (D) and slide the instrument forward.

2.2.4 Stacking.

When two or more bench-mount instruments are to be stacked, they should be secured together. This can be accomplished in the following manner:

a. Order part number 5310-3304 hardware set (Table 2-3) for each instrument to be stacked to a base instrument.

b. Place the instrument on top of the base instrument with the feet of the end frame in the channel of the base end frames (Figure 2-5).

c. Place a 15/32-inch spacer (A) over each of the four holes on the top of the base end frames and line up the holes in the bottom of the end frames on the top instrument with the spacers.

d. Insert a No. 10, 1-inch screw (B) through each of the four holes in the bottom of the end frame on the top instrument and see that the screw comes through the top of the bottom end frame.

e. Tighten the assembly by securing a No. 10 locking nut on each of the four mounting screws.

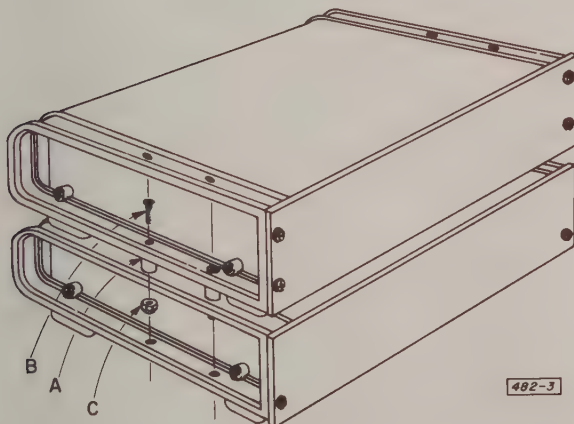


Figure 2-5. End frame stacking diagram.

2.3 EXTERNAL CONNECTIONS.

2.3.1 Power.

The 1125 Parallel-Storage Unit can be powered from either a 100-125 V or 200-250 V, 50-60 Hz source. Before connecting the power cord to the plug (8, Figure 1-2) on the rear panel, set switch S152 (9, Figure 1-2) in the proper line-voltage position. The fuses installed in the instrument are connected so that they will protect the unit for either line voltage.

2.3.2 Signal Cables (Figure 2-6).

BCD DATA INPUT. Connect the cable with the 50-pin and 52-pin connectors (P/N 4205-1060) between the BCD DATA INPUT socket on the 1125 and the DIGITAL OUTPUT socket on the 1123.

BNC to BNC. Connect the 24-inch cable with BNC plugs at each end (P/N 8161-1600) between the 100-kHz output jack on the 1123 and the 100-kHz input jack on the 1125.

STORE. Connect a suitable patch cord that can carry a store signal to the STORE input. The store input jack is a BNC type accessible directly through a BNC plug or through a GR adaptor.

GR 1137 PRINTER. Connect the 50-pin connector on the cable from the printer to the BCD DATA OUTPUT socket on the 1125.

NOTE

See Figure 6-6 for the proper pin connections.

TABLE 2-3 HARDWARE SET 5310-3304* CONTENTS			
QUANTITY	DESCRIPTION	FIG. 3 REF.	GR PART NO.
4	Nut, No. 10, locking	C	5820-0500
4	Screw, Phillips-head, 10-32, 1 inch	B	7080-3200
4	Spacer, aluminum, No. 10, 15/32 inch	A	7660-2015

* This hardware set is available for stacking at an extra cost.

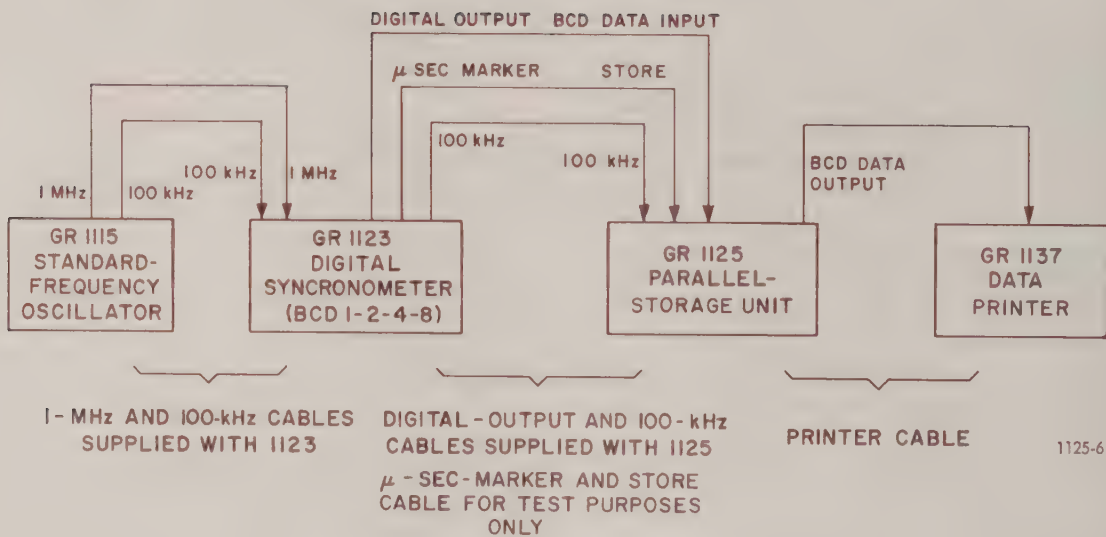


Figure 2-6. Interconnection of storage instruments.

Operating Procedures – Section 3

3-1	INITIAL SETUP	3-1
3-2	STORE PULSE	3-1
3-3	OPERATIONAL CHECKOUT	3-1
3-4	GR TYPE 1137 PRINTER OPERATION	3-2
3-5	OPTIONAL PRINTER OPERATION	3-2

3.1 INITIAL SETUP.

The following procedure should be used to get the 1125 into a functional state:

- Connect the power according to paragraph 2.3.1.
- Connect the 100-kHz shielded cable (P/N 3161-1600) and the data cable (P/N 4205-1060) as in paragraph 2.3.2.
- Switch S153 (21, Figure 1-2) to the NEG position so that data transfer is referenced to the negative-going transition of the 1123's 100-kHz output signal.
- Ground the DATA-0 jack (4, Figure 1-2) with the link (12, Figure 1-2) provided.

3.2 STORE PULSE.

NOTE

For testing the storage system and its interconnections, the μ s MARKER output from the 1123 can be used as a storage-command pulse.

A store pulse must be provided at the BNC STORE input to initiate transfer of data to the 1125. With switch S154 (19, Figure 1-2) in the POS position, this input can be a pulse or dc level shift from 0 V to +5 V (or greater). With the switch in the NEG position, a transition from +5 V (or greater) down to 0 V is required. The DATA-1 reference output (14, Figure 1-2) can be used as a source to generate this transition if some form of switch closure is to be the initiating medium.

NOTE

Many of the rear panel switching and interconnecting facilities are not required in a simple installation. When the BCD DATA OUTPUT is not being used in a particular

system, the INT-EXT inhibit switch (18, Figure 1-2) should be left in the INT position so that the position of S156 (16, Figure 1-2) has no effect. Other combinations could prevent data storage.

3.3 OPERATIONAL CHECKOUT.

The complete storage system can be checked out to insure that all circuits and interconnections are functioning properly. This test should be made the first time the system is used to check the integrity of all circuits and interconnections. The 1125 will store the time of the 1123 down to 10 μ s on command of the μ s MARKER. Hours, minutes and seconds will read the same as the 1123 visual register and by setting the display with the SET TIME switches of the 1123, these six digits can be checked. In addition, the time increments from 100 ms to 10 μ s are stored and indicate the setting of the 1123 delay switches (first five from the left). Since the 1123 delay output is generated by recognizing the states of its counting registers, storing the data at this instant will indicate the state of the registers (i.e., the delay setting).

NOTE

Due to the programming time in the 1123, the displayed time will always be 10 μ s greater than the delay setting.

To check the operation of the system, proceed as follows:

- Set the 1125 up as in paragraph 3.1.
- Set S154 (19, Figure 1-2) to POS.
- Set the PROGRAM switch on the 1123 to SET.
- Set the VISUAL REGISTER switch on the 1123 to 10 HOUR.

e. Push the INITIATE button on the 1123 while observing the ten-hours digit on both the 1123 and 1125. The digit should display all ten digits, one at a time, as the INITIATE button is pressed.

f. Set the VISUAL REGISTER switch to the HOUR position and follow the procedure of step e using the one-hour digit. Continue this procedure through the SECOND position of the VISUAL REGISTER switch and the one-second digit.

g. Rotate the 100-ms TIME DELAY switch of the 1123 through its positions and observe that the number appearing on the switch also appears on the first digit to the right of the decimal point on the 1125. The X positions will initiate storage at a 10-Hz rate.

h. Rotate the 10-ms switch through its positions and observe that the number appearing on the switch also appears on the second digit to the right of the decimal point on the 1125.

i. Rotate the 1-ms switch through its positions and observe the corresponding numbers on the 1125 at the third digit to the right of the decimal point.

j. Rotate the 100- μ s and 10- μ s switches through their positions and check the fourth and fifth digits to the right of the decimal on the 1125.

NOTE

The 10- μ s data stored will be 10- μ s greater than that indicated on the 1123 switch.

k. Set the VISUAL REGISTER and PROGRAM switches of the 1123 to the OPERATE position. If the 1123 isn't displaying the correct time, reset the digits according to the 1123 Instruction Manual.

3.4 GR TYPE 1137 PRINTER OPERATION.

If the 1125 is used with an 1137 Data Printer, a print command and internal inhibit will be automatically generated each time a store command is given. The stored data will appear on the visual indicators of the 1125 and on the paper readout of the 1137 (refer to paragraphs 3.1 and 3.2 for proper switch settings). The 1125 generates an inhibit signal that prevents new data from being stored while the printer is operating. If a store command has been given during this interval, new data will be stored at the end of the print cycle since the 1125 remembers the receipt of the store command.

3.5 OPTIONAL PRINTER OPERATION.

The 1125 can be used with other types of printers (i.e., high speed) or various data processing equipment. The internally generated print command can be adjusted (paragraph 5.5.4) in duration from 20 ms to 500 ms to accommodate most printers.

The external inhibit input can be used if the internal one is inadequate for a particular application.

CAUTION

When such an external inhibit is used, care should be taken that no greater than a 10- μ s delay exists between the generation of a store-command pulse and the application of an inhibit signal to the 1125.

This is necessary to prevent a second store command from changing the data before the input has been inhibited.

Principles of Operation—Section 4

4-1	GENERAL	4-1
4-2	CHARACTERISTICS OF THE UNIT	4-1
4-3	CIRCUIT DESCRIPTIONS	4-2

4.1 GENERAL.

This section describes the characteristics of the control signals and the functions of the circuits in the instrument. Section 6 includes the logic diagram of the unit. Reference to this figure will be necessary throughout this section. Reference to the specific circuit diagrams of Section 6 will be necessary while reading paragraph 4.3.

4.2 CHARACTERISTICS OF THE UNIT.

4.2.1 Transfer Characteristics.

The data input characteristics are tailored to interface with the GR 1123 having a 1-2-4-8 BCD output code with buffered data lines. Input data is sampled for a duration of approximately 2 μ s. The sampling pulse is synchronized with the 100-kHz output of the 1123 to prevent data storage during flip-flop transitions. These data are transferred into storage immediately with no zero set required (i.e., jam transfer). This data then appears at the data output connector and is displayed on the indicators.

4.2.2 Store Command

The transfer of data can be initiated by either a positive-going or negative-going transition depending on the position of the polarity switch. The input is dc coupled, however, so that the input level must swing between 0 V and +5 V or greater. The input impedance is >100 k Ω . A positive supply voltage is available at the DATA-1 output jack, if required, to generate an input pulse. The store-command input sets a flip-flop that remembers the receipt of a command so that data will be transferred at the end of any inhibit signal that may be present.

4.2.3 Inhibit Signals.

The 100-kHz input is more accurately termed a synchronizing signal as it actually initiates the storage of data after arming by a store command. This signal ensures that 1123 data does not change while being transferred.

The INHIBIT input allows a printer, or other data-processing device, to inhibit storage of new data while the present data is being processed. Normally this signal is generated internally (it is the same signal as the print command), but in special applications it can be supplied externally. The input characteristics are the same as the store input, i.e., dc-coupled input >100 k Ω impedance, and a minimum swing of 5 V referenced to ground.

4.2.4 Print Command.

The print-command output appears at BNC jack J156 and on the data-output connector S0202, pin 23. The instrument is normally shipped with the print duration and polarity required by the 1137 Printer. This is a negative-going pulse (+15 V to 0 V) of approximately 300-ms duration. The duration can be adjusted over the range of 20 ms to 500 ms with R111. The print-command pulse is triggered at the same time as the leading edge of the data-ready signal.

4.2.5 Data Ready Signal.

The DATA READY signal is a positive output pulse (J154) occurring 10 μ s after data has been stored, indicating that transfer is complete. The duration is 50 μ s with an amplitude of 15 V behind 5 k Ω . In multiple storage systems this pulse could be used to signal a second 1125 to transfer data.

4.2.6 Reference Voltages.

The DATA-0 of the 1125 must be referenced with respect to the input data levels. With the 1123, the DATA-0 is set at ground potential with the jumper across jacks J152 and J153. This also sets the 0 level of the output data at 0 V.

4.3 CIRCUIT DESCRIPTIONS.

4.3.1 Indicator Driver (Figure 6-10).

The eleven indicator-driver circuits (P/N 1125-4720) convert the input 4-line BCD data to 10-line output. The logic conversion is performed with the same transistor circuits that provide the 14-V, 80-mA drive for the incandescent lamps. Since the lamps do not require well-filtered dc, this circuit operates on rms-regulated but unfiltered dc.

4.3.2 Output (Figure 6-8).

The output circuit (P/N 1125-4711) generates the print command, internal-inhibit signal and data-ready signal. An adjustable delay generator (Q101 and Q102) operates in conjunction with a flip-flop to produce the internal-inhibit signal and the print command. An output buffer (Q103 and Q104) is used for the print-command signal. The data-ready signal is generated by the monostable (Q105 and Q106) and buffered by the Q107-Q108 circuit.

4.3.3 Program (Figure 6-16).

The program board (P/N 1125-4761) controls the over-all operation of the storage and timing signals (Figure 4-1). A delay generator (Q601 and Q602) establishes the proper phase between the input 100-kHz signal from the 1123 and the input data. This signal is combined with the inhibit signal (either external or internal) and the storage-command signal from flip-flop 1 in AND gate G1 (Q603, Q607, and Q608). This gated storage signal triggers flip-flop 2 to the Q state and in turn the storage-pulse generator blocking oscillator (Q606). A second 100-kHz pulse passes G1 10 μ s later and returns flip-flop 2 to the Q state. This transition generates the data-ready signal, the print command via flip-flop 3, and resets flip-flop 1 for the receipt of a new storage pulse.

4.3.4 Input (Figure 6-14).

Four input circuits are provided on the input printed-circuit board (P/N 1125-4740), three for normal operation and a fourth for special system applications. Each circuit is

composed of an input buffer, dc coupled, and a set-reset flip-flop. The circuit responds to a level shift from 0 V to +5 V or greater. The input polarity switch changes the selected flip-flop output to allow the desired function to occur either on an input transition from 0 V to +5 V (POS) or +5 V to 0 V (NEG). Ac coupling is possible with the addition of an external capacitor. The input impedance is 100 k Ω in parallel with 100 pF.

4.3.5 Storage (Figure 6-12).

The eleven storage circuits (P/N 1125-4730) are identical and each stores one 4-bit binary coded decimal digit. The circuit is basically a latch with both transistors being either ON or OFF. To store new data, simultaneous positive and negative pulses, PLEP and PLEN respectively, are applied to the gating diodes. PLEP reverse biases the input diode (CR301) allowing the input transistor (Q301) to turn ON if a data-1 level is applied. PLEN forward biases the clamp diode (CR302) breaking the latch feedback loop, thus turning off both transistors if a data-0 level is applied. Therefore, the stored data changes instantly to the value of the input data upon application of the storage pulses. Diode CR303 clamps the output-1 level to 10 V, while output resistors R310 and R311 isolate the data output lines to the indicators as well as the output connector.

4.3.6 Power Supply (Figure 6-3, 6-20, 6-22).

Two regulator circuits are incorporated in the unit, one a +15 V dc supply for the storage circuitry (P/N 1158-4751) and the other a +14 V rms supply for the indicators and lamp drivers (P/N 1158-4756). Both are of plug-in design with the rectifiers an integral part of the plug-in board. The series regulator transistors and the dc supply filter capacitor are chassis mounted. The +15 V dc supply is a Zener controlled regulator. The lamp supply is unfiltered and employs a lamp bulb to detect and stabilize the rms value of the output voltage.

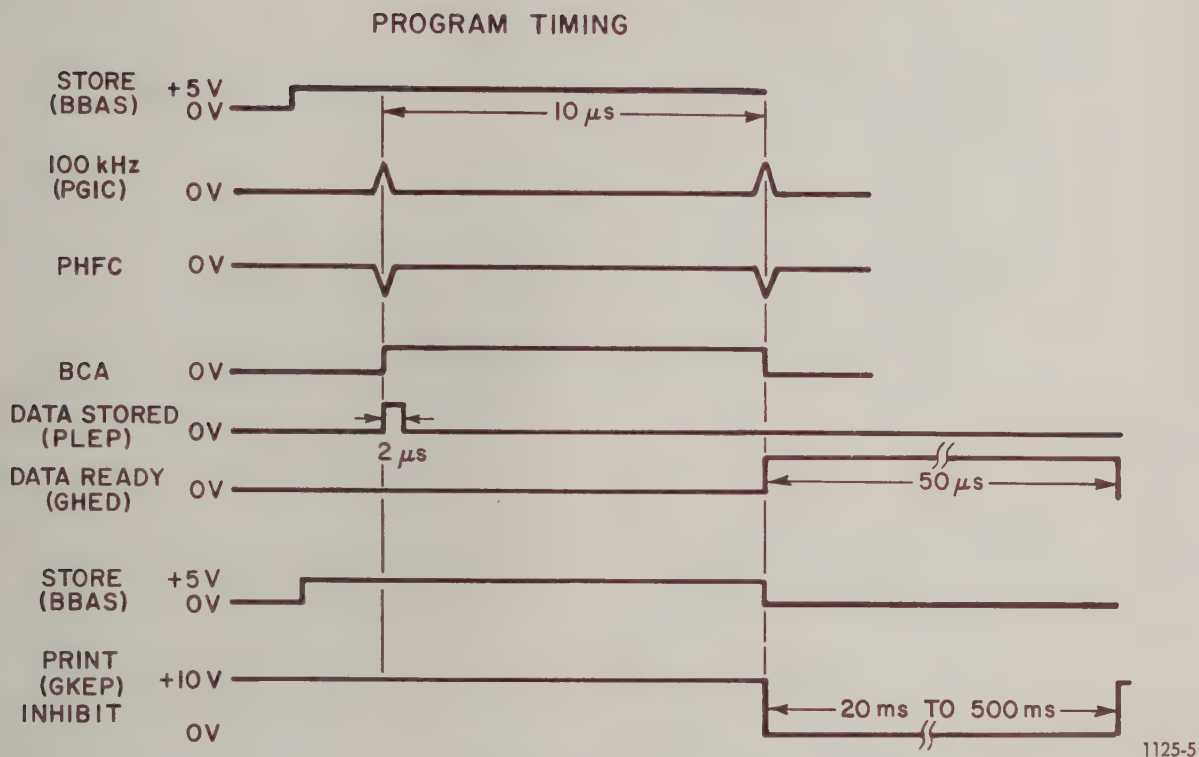


Figure 4-1. Program timing of the 1125.

Service and Maintenance—Section 5

5-1	WARRANTY	5-1
5-2	SERVICE	5-1
5-3	MINIMUM PERFORMANCE STANDARDS	5-1
5-4	TROUBLE ANALYSIS	5-1
5-5	CALIBRATION	5-3
5-6	REPLACEMENT OF INDICATOR LAMPS	5-4
5-7	KNOB REMOVAL AND INSTALLATION	5-4

5.1 WARRANTY.

We warrant that each new instrument manufactured and sold by us is free from defects in material and workmanship and that, properly used, it will perform in full accordance with applicable specifications for a period of two years after original shipment. Any instrument or component that is found within the two-year period not to meet these standards after examination by our factory, District Office, or authorized repair agency personnel will be repaired or, at our option, replaced without charge, except for tubes or batteries that have given normal service.

5.2 SERVICE.

The two-year warranty stated above attests the quality of materials and workmanship in our products. When difficulties do occur, our service engineers will assist in any way possible. If the difficulties cannot be eliminated by use of the following service instructions, please write or phone our Service Department (see rear cover), giving full information of the trouble and of steps taken to remedy it. Be sure to mention the type and serial numbers of the instrument.

Before returning an instrument to General Radio for service, please write to our Service Department or nearest District Office, requesting a Returned Material Tag. Use of this tag will ensure proper handling and identification. For instruments not covered by the warranty, a purchase order should be forwarded to avoid unnecessary delay.

5.3 MINIMUM PERFORMANCE STANDARDS.

The operation of the 1125 can be checked out easily by following the procedure given in paragraph 3.3. If a failure occurs, refer to paragraph 5.4 for trouble-analysis information.

5.4 TROUBLE ANALYSIS.

5.4.1 General.

The information contained in this section is designed to assist in the analysis of a faulty condition in the 1125. Table 5-1 lists the equipment needed for checking out the circuits and Table 5-2 lists the transistor voltages that can be expected in each stage of each circuit.

5.4.2 Test System.

The circuit shown in Figure 2-6 should be used for those checks made under running conditions. For the checks at dc conditions, remove the signal inputs at the rear of the 1125.

5.4.3 Circuit Checks

Each circuit can be checked for various dc and signal conditions to determine if a faulty condition exists. Calibration adjustments are given in paragraph 5.5. Reference to Section 6 will be necessary for circuit diagrams. Figures 5-1 and 5-2 will help in locating sockets and test points.

Dc Power Supply Regulator (P/N 1158-4751).

Check the dc voltage at S0133, pin 7 to be approximately +21 V with a line voltage of 115 V and at pin 10 to be +15 V. The transistor voltages are given in Table 5-2.

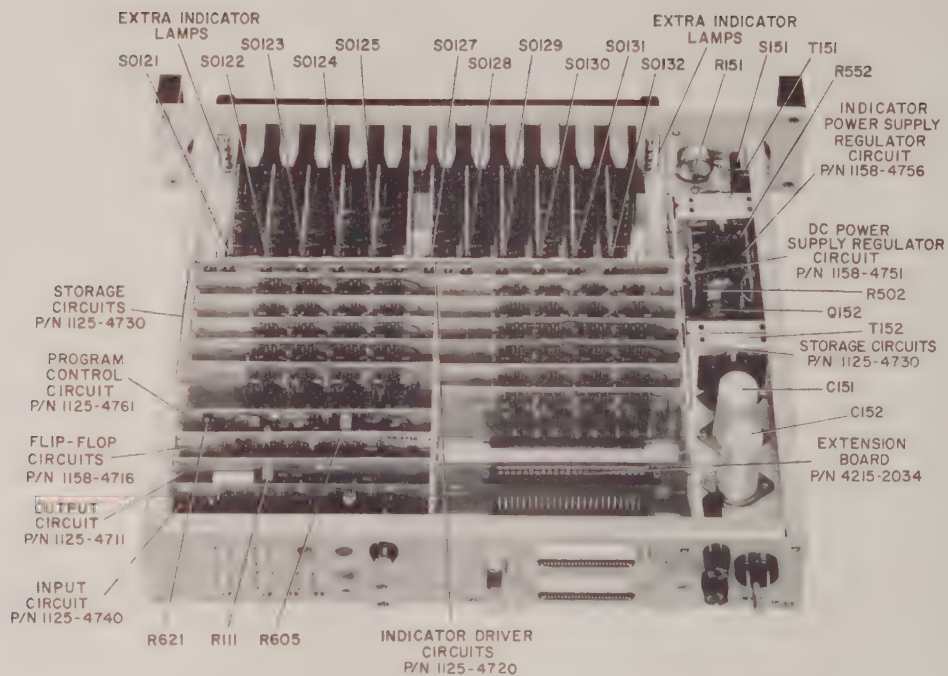


Figure 5-1. Top interior view of the 1125.

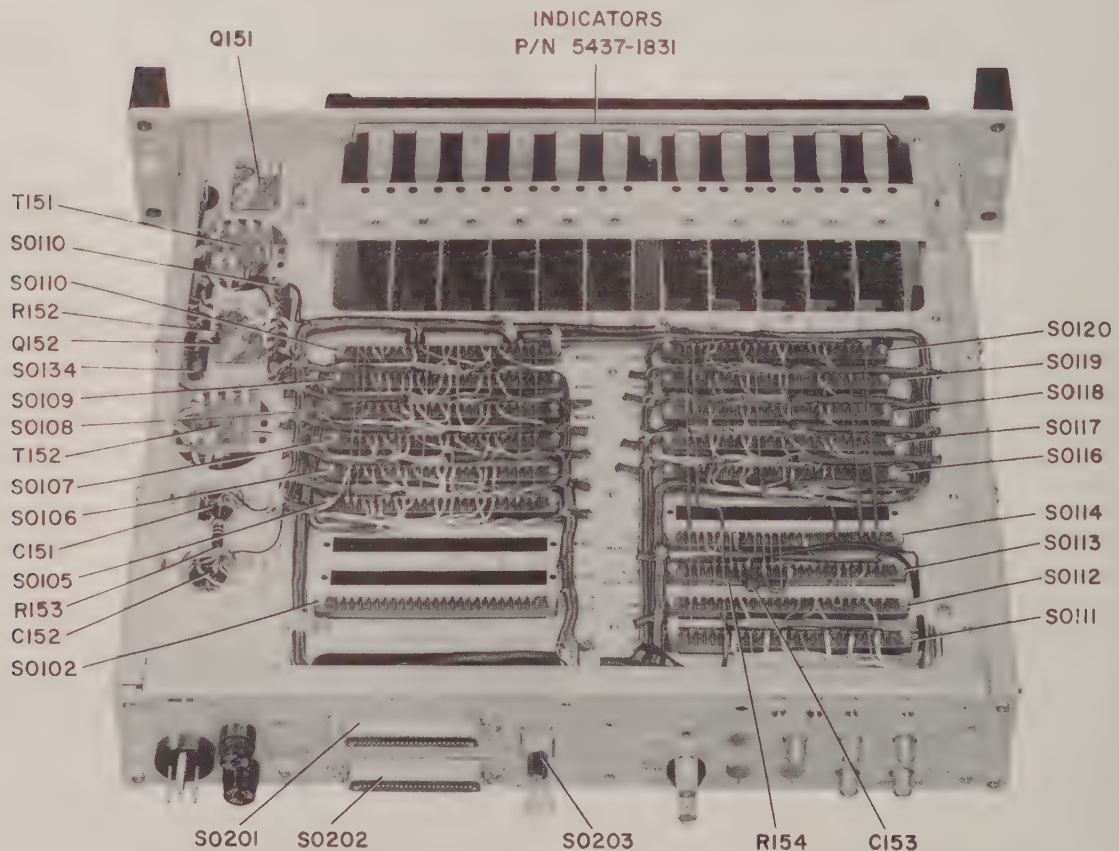


Figure 5-2. Bottom interior view of the 1125.

Indicator Power Supply Regulator (P/N 1158-4756).

Check the voltage at S0134, pin 5 to be +14 V rms with the front panel INTENSITY control full cw. The voltmeter used should read true rms (i.e. dc and ac; thermocouple detector); however, a 20 k Ω /V VOM will read approximately 23 V rms.

Flip-Flops (P/N 1158-4716).

The flip-flop board can be checked with the instrument running in the setup of Figure 2-6. Check the outputs of each flip-flop for the pulses shown in Table 5-3 for this circuit. The output pins are 8, 9, 11, 12, 19 and 23 of S0113.

Input Circuit (P/N 1125-4740).

The input-board circuits can be checked by injecting a sine-wave signal into the INPUT jacks at the rear of the instrument. Connect a 100-Hz, 10-V pk-pk sine-wave signal (GR 1310 Oscillator) to the 100-kHz INPUT jack. Disconnect the 100-kHz and STORE cables shown in Figure 2-6. Connect an oscilloscope to S0111, pin 22, and observe the square-wave output from the flip-flop circuit (repeat for pin 23). Table 5-3 shows the approximate value of the pulses. Figure 6-13 and 6-14 will help in component location. If the switching is proper at 100 Hz, inject 100 kHz and check that the triggers still operate properly. Repeat the above procedure with an input in the STORE and INHIBIT jacks. Refer to Figure 6-14 for the output pin numbers.

The input board contains a spare flip-flop circuit. This can be checked, if necessary, by injecting a test signal (100 Hz, sine wave) at S0111, pin 2, and checking the outputs at pins 3 and 4.

Program Circuit (P/N 1125-4761).

Connect the 100-kHz and STORE cables shown in Figure 2-6. Using Figures 6-15 and 6-16, check the pulses shown in the program timing diagram (Figure 4-1) that are available at S0114.

On the etched-circuit board, check the waveform at the collector of Q602 (Table 5-3).

Output Circuit (P/N 1125-4711).

Figures 6-7 and 6-8 show the etched-circuit board and the schematic diagrams respectively. The indicated dc voltages of Figure 6-7 can be checked with the VTVM and the PRINT (GKEP), DATA READY (GHED) and BCA signals can be observed on the oscilloscope and compared to the program timing diagram (Figure 4-1). The DATA READY pulse should be approximately 50 μ s in duration.

The PRINT pulse is adjustable and can be anywhere between 20 ms and 500 ms (300 ms for use with the GR 1137 Data Printer). If in adjusting the PRINT pulse the pulse is lost before the maximum (500 ms) is reached, check Q101.

Indicator Driver (P/N 1125-4720).

Check the transistor voltages listed in Table 5-2 for this circuit. Also, check the mechanical action and contact of the spring contacts that attach the board circuitry to the indicators. Figures 6-9 and 6-10 will help in part identification and location.

Storage Circuit (P/N 1125-4730).

Figures 6-11 and 6-12 show the etched-circuit board and schematic diagrams for the storage circuit. Check the +15 V dc pin on the socket for the dc supply voltage. With the oscilloscope, check the DATA STORED (PLEP) pulse at pin 22 (S0104-S0110) and compare it to the program timing diagram (Figure 4-1). Also, check the PLEN pulse at pin 24 to be a negative going pulse of 2 μ s duration.

Cables (P/N 8161-1600, 4205-1060).

The two external hook-up cables can be checked for continuity with an ohmmeter. The pin connections are listed on the BCD DATA INPUT cable diagram (Figure 6-24) for PL1 and PL2.

5.5 CALIBRATION.

5.5.1 General.

The adjustments given in this section are those necessary to maintain the 1125 within catalog specifications. The equipment listed in Table 5-1 is necessary. Location of adjustable components can be seen in Figure 5-1; the observation points (with one exception) are on the sockets shown in Figure 5-2. The point not on a socket is on the Program board at the collector of Q602. The setup shown in Figure 2-6 should be used for calibrating the 1125.

5.5.2 Power Supply.

Set the power supply voltage to +15 V dc with R502. Use the VTVM to make the measurement at S0133, pin 10. The line voltage should be in the range of 95 to 125 V (115 V nominal).

5.5.3 Program.

Adjust R605 for a 5 μ s duration pulse at the collector of Q602 (paragraph 5.4.3, *Program Circuit*). The Program board can be elevated with the extension board if desired.

Adjust R621 for a 2 μ s pulse (PLEP) of +8- to +10-V amplitude at S0114, pin 22.

5.5.4 Output.

Adjust R111 for a PRINT (GKEP) pulse of 300 ms duration at S0112, pin 16. The amplitude will be about 10-V negative going from a +10-V level. The duration of 300 ms is usually supplied, but an adjustment can be made from 20 ms to 500 ms depending on the pulse duration needed for a particular printer.

5.6 REPLACEMENT OF INDICATOR LAMPS.

To replace an indicator lamp, proceed as follows:

- a. Pull off the protective bezel.
- b. Grasp the indicator retaining springs (at top and bottom of indicator) between the index finger and the thumb.
- c. Push in as you compress the springs and then pull the indicator out with a slow steady motion.
- d. Remove the defective lamp from the indicator and replace it with a spare lamp from one of the holders adjacent to the extreme outside indicators.
- e. Reinstall the indicator with the numbered side to the left as seen from the front.

5.7 KNOB REMOVAL AND INSTALLATION.

5.7.1 Knob Removal.

To remove the knob on the front-panel control, either to replace one that has been damaged or to replace the associated control, proceed as follows:

- a. Grasp the knob firmly with the fingers close to the panel and pull the knob straight away from the panel.
- b. Observe the position of the setscrew in the bushing when the control is full ccw.

- c. Release the setscrew and pull the bushing off the shaft. Use a 1/16-Allen wrench.

NOTE

To separate the bushing from the knob, if for any reason they should be combined off of the shaft, drive a machine tap a turn or two into the bushing to provide sufficient grip for easy separation.

5.7.2 Knob Installation.

To install a knob assembly on the control shaft:

- a. Mount the bushing on the shaft, using a small slotted piece of wrapping paper as a shim for adequate panel clearance.
- b. Orient the setscrew properly on the bushing, with respect to step b. in paragraph 5.7.1, and lock the setscrew with a 1/16-Allen wrench.

NOTE

If the end of the shaft protrudes through the bushing, the knob cannot seat properly.

- c. Place the knob on the bushing with the retention spring opposite the setscrew.
- d. Push the knob in until it bottoms and pull it slightly, to check that the retention spring is seated in the groove in the bushing.

NOTE

If the retention spring in the knob is loose, re-install it in the interior notch with the small slit in the inner diameter of the wall.

TABLE 5-1
TEST EQUIPMENT

NAME	MINIMUM USE	RECOMMENDED EQUIPMENT*
Clock	Generates BCD 1-2-4-8 data and timing pulses exactly like those of the GR 1123.	GR 1123 Digital Synchronometer** (P/N 1123-9760 or -9763)
Standard Oscillator	Precision standard-frequency oscillator generating at least 0.5 V at 100 kHz and 0.5 V at 1 MHz (sinusoid or square wave) to drive the clock.	GR 1115 Standard-Frequency Oscillator. (P/N 1115-9803 or -9813)
Oscilloscope	Capable of displaying the pulses generated within the 1125.	Tektronix Type 454 Portable Sweep-Delay Oscilloscope (Includes probe)
Oscillator	Capable of generating 100-Hz and 100-kHz, 10-V pk-pk sine waves.	GR 1310 Oscillator
VTVM	Capable of measuring the dc voltages at the transistors (0 to 25V).	GR 1806 Electronic Voltmeter (P/N 1806-9701)
Adjusting Tool	Blade-type tool for adjusting potentiometers.	J.F.D. #5284 Adjusting Tool.
Patch Cord	BNC to BNC plug (male) cable to connect GR 1123 μ SEC MARKER output to GR 1125 STORE input.	GR 776-C Patch Cord (P/N 0776-9703)
Voltmeter	Reads true rms, + 14 V necessary.	Rawson Type 502-D Thermal Multimeter
VOM	Reads ohms and rms voltage.	Triplett Model 630-NA

* Or equivalent.

** This instrument must be used if the proper pulses are to be supplied to the 1125.

TABLE 5-2
TRANSISTOR VOLTAGES¹

CIRCUIT	TRANSISTOR	COLLECTOR VOLTS	BASE VOLTS	EMITTER VOLTS
Dc Power Supply Regulator ² (P/N 1158-4751)	Q501 Q502 Q503	21.0 ⁵ 20.0 ⁵ 21.0 ⁵	20.5 ⁵ 9.0 15.0 ³	21.0 ⁵ 8.5 14.0
Indicator Power Supply Regulator ² (P/N 1158-4756)	Q551 Q552 Q553	14.5 16.5 14.5	17.0 2.0 12.0	15.0 1.6 11.2
Flip-Flops ² (P/N 1158-4716)	Q101 through Q105	ON OFF 0.9 13.5	ON OFF 1.4 0.32	ON OFF 0.76 0.76
Input ² (P/N 1125-4740)	Q401, Q405, Q409, Q413 Q402, Q406, Q410, Q414 Q403, Q407, Q411, Q415 Q404, Q408, Q412, Q416	14.0 0 13.5 1.5	0.1 0.1 0.7 2.0	0.7 0.7 1.4 1.4
Program ² (P/N 1125-4761)	Q601 Q602 Q603 Q604 Q605 Q606 Q607 Q608	0.9 15.0 15.0 0.9 15.0 10.2 3.1 3.0	1.4 0.25 0 1.43 1.15 0 3.25 0.22	0.72 0.35 3.1 0.72 0.67 0 3.0 0.32
Program ⁴ (P/N 1125-4761)	Q601 Q602 Q603 Q604 Q605 Q606 Q607 Q608	11.5 5.6 3.0 1.0 15.0 10.2 6.4 7.7	0.1 2.4 2.4 1.45 1.45 0 0.2 0.3	5.6 3.0 0.8 0.75 0.70 0 0.75 1.06
Output ² (P/N 1125-4711)	Q101 Q102 Q103 Q104 Q105 Q106 Q107 Q108 Q109	4.7 15.0 15.0 0 15.0 1.5 15.0 0 15.0	14.6 4.7 13.1 13.1 0.5 2.1 1.5 1.5 0	15.0 13.0 12.5 12.5 0.8 1.4 1.1 1.1 0
Indicator Driver ² (P/N 1125-4720)	Q201 Q202 Q203 Q204 Q205 Q206	ON OFF 3.7 14.0 6.2 14.0 0.5 14.0 0.5 14.0 0.2 14.0 0.2 14.0	ON OFF 4.2 0 2.7 2.7 14.0 13.5 14.0 13.5 0.8 0 0.8 0	ON OFF 3.6 2.1 2.1 3.6 14.0 14.0 14.0 14.0 0.1 0.7 0.1 0.7

TABLE 5-2 (continued)
TRANSISTOR VOLTAGES¹

CIRCUIT	TRANSISTOR	COLLECTOR VOLTS		BASE VOLTS		EMITTER VOLTS	
	Q207	0.8	0	1.6	10.4	2.3	4.3
	Q208	0.8	0	1.6	10.4	2.3	4.3
	Q209	0.2	14.0	0.8	0	0.1	0.7
	Q210	0.2	14.0	0.8	0	0.1	0.7
	Q211	0.1	13.0	0.8	0	0	0
	Q212	0.95	14.5	1.6	0	0.9	0
	Q213	0.1	0.7	0.7	0	0	0
	Q214	0.8	0	1.6	10.4	2.3	4.3
	Q215	0.8	0	1.6	10.4	2.3	4.3
	Q216	0.1	0.7	0.7	0	0	0
Storage ²	Q301, Q303, Q305, Q307	15.0		0.2		0	
(P/N 1125-4730)	Q302, Q304, Q306, Q308	0		15.0		15.0	
Storage ⁴	Q301, Q303, Q305, Q307	10.0		1.9		2.1	
(P/N 1125-4730)	Q302, Q304, Q306, Q308	10.7		10.7		10.0	

¹ Measurements made with GR 1806 Electronic Voltmeter. Voltages are dc. The extension board (P/N 4215-2034) can be used for these measurements.

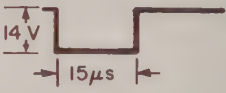
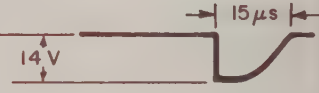
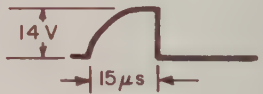
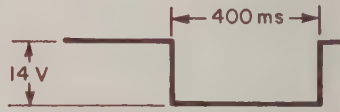
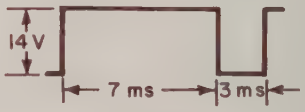
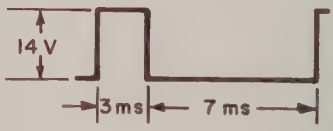
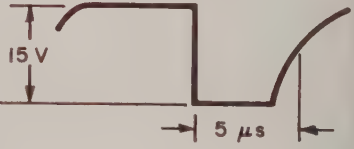
² Voltages are for a dc condition; that is, no signal input.

³ Adjustable with R502.

⁴ Voltages are for running conditions; that is, signal inputs applied from GR 1123 Digital Synchronometer® Time Comparator.

⁵ These power-supply voltages depend on the line-voltage level.

TABLE 5-3
TROUBLE-ANALYSIS WAVEFORMS

Circuit	Socket	PIN	Waveform
Flip-Flop (P/N 1158-4716)	S0113	8	
		9	
		11	
		12	
		19	
		23	
Input Circuit (P/N 1125-4740)	S0111	22	 (100 - Hz INPUT)
		23	 (100 - Hz INPUT)
Program Circuit (P/N 1125-4761)	Q602	Collector	

1125-7

Parts Lists and Diagrams—Section 6

The parts list, etched-circuit board, and schematic diagram for a specific circuit are on adjacent pages.

CONTENTS

Schematic	Part Number of Etched-Board Assembly	Number of Boards Used	Reference Number Series	Page
Federal Manufacturers List	_____	_____	_____	6-2
Mechanical Parts	_____	_____	_____	6-3
Signal Index	_____	_____	_____	6-4
Logic Diagram	_____	_____	_____	6-5
Power Supply	_____	_____	150	6-7
24-pin sockets	_____	_____	_____	6-9
6-pin sockets	_____	_____	_____	6-11
Input and Output jacks and sockets	_____	_____	_____	6-13
Output Circuit	1125-4711	1	100	6-15
Indicator Driver	1125-4720	11	200	6-17
Storage Circuit	1125-4730	11	300	6-19
Input Circuit	1125-4740	1	400	6-21
Program Circuit	1125-4761	1	600	6-23
Flip-Flop Circuit	1158-4716	1	100	6-25
Dc Power Supply Regulator	1158-4751	1	500	6-27
Indicator Power Supply Regulator Circuit	1158-4756	1	550	6-29
Cable Assembly (P/N 8161-1600)	_____	_____	_____	6-31
Signal Cable (P/N 4205-1060)	_____	_____	_____	6-31

FEDERAL MANUFACTURER'S CODE

From Federal Supply Code for Manufacturers Cataloging Handbooks H4-1
(Name to Code) and H4-2 (Code to Name) as supplemented through August, 1968.

Code	Manufacturer	Code	Manufacturer	Code	Manufacturer
00192	Jones Mfg. Co, Chicago, Illinois	49671	RCA, New York, N.Y. 10020	80431	Air Filter Corp, Milwaukee, Wisc. 53218
00194	Walsco Electronics Corp, L.A., Calif.	49956	Raytheon Mfg Co, Waltham, Mass. 02154	80583	Hammarlund Co, Inc, New York, N.Y.
00434	Schwaber Electronics, Westburg, L.I., N.Y.	53021	Sangamo Electric Co, Springfield, Ill. 62705	80740	Beckman Instruments, Inc, Fullerton, Calif.
00656	Aerovox Corp, New Bedford, Mass.	54294	Shallcross Mfg Co, Selma, N.C.	81030	International Instrument, Orange, Conn.
01009	Alden Products Co, Brockton, Mass.	54715	Shure Brothers, Inc, Evanston, Ill.	81073	Grayhill Inc, LaGrange, Ill. 60525
01121	Allen-Bradley, Co, Milwaukee, Wisc.	56289	Sprague Electric Co, N. Adams, Mass.	81143	Isolantite Mfg Corp, Stirling, N.J. 07980
01295	Texas Instruments, Inc, Dallas, Texas	59730	Thomas and Betts Co, Elizabeth, N.J. 07207	81349	Military Specifications
02114	Ferroxcube Corp, Seugerties, N.Y. 12477	59875	TRW Inc, (Accessories Div), Cleveland, Ohio	81350	Joint Army-Navy Specifications
02606	Fenwal Lab Inc, Morton Grove, Ill.	60399	Torrington Mfg Co, Torrington, Conn.	81751	Columbus Electronics Corp, Yonkers, N.Y.
02660	Amphenol Electron Corp, Broadview, Ill.	61637	Union Carbide Corp, New York, N.Y. 10017	81831	Filtron Co, Flushing, L.I., N.Y. 11354
02768	Fastex, Des Plaines, Ill. 60016	61864	United-Carr Fastener Corp, Boston, Mass.	81840	Ledex Inc, Dayton, Ohio 45402
03508	G.E. Semicon Prod, Syracuse, N.Y. 13201	63060	Victoreen Instrument Co, Inc, Cleveland, O.	81860	Barry-Wright Corp, Watertown, Mass.
03636	Grayburne, Yonkers, N.Y. 10701	63743	Ward Leonard Electric Co, Mt. Vernon, N.Y.	82219	Sylvania Elec Prod, Emporium, Penn.
03888	Pyrofilm Resistor Co, Cedar Knolls, N.J.	65083	Westinghouse (Lamp Div), Bloomfield, N.J.	82273	Indiana Pattern & Model Works, LaPort, Ind.
03911	Clairex Corp, New York, N.Y. 10001	65092	Weston Instruments, Newark, N.J.	82389	Switchcraft Inc, Chicago, Ill. 60630
04009	Arrow-Hart & Hegeman, Hartford, Conn. 06106	70485	Atlantic-India Rubber, Chicago, Ill. 60607	82647	Metals & Controls Inc, Attleboro, Mass.
04713	Motorola, Phoenix, Ariz. 85008	70563	Amperlite Co, Union City, N.J. 07087	82807	Milwaukee Resistor Co, Milwaukee, Wisc.
05170	Engrd Electronics, Santa Ana, Calif. 92702	70903	Belden Mfg Co, Chicago, Ill. 60644	83033	Melnsner Mfg. (Maguire Ind) Mt. Carmel, Ill.
05624	Barber-Colman Co, Rockford, Ill. 61101	71126	Bronson, Homer D. Co, Beacon Falls, Conn.	83058	Carr Fastener Co, Cambridge, Mass.
05820	Wakefield Eng. Inc, Wakefield, Mass. 01880	71294	Canfield, H.O. Co, Clifton Forge, Va. 24422	83186	Victory Engineering, Springfield, N.J. 07081
07126	Digitron Co, Pasadena, Calif.	71400	Bussman (McGraw Edison), St. Louis, Mo.	83361	Bearing Specialty Co, San Francisco, Calif.
07127	Eagle Signal (E.W. Bliss Co), Baraboo, Wisc.	71468	ITT Cannon Elec, L.A., Calif. 90031	83587	Solar Electric Corp, Warren, Penn.
07261	Avnet Corp, Culver City, Calif. 90230	71590	Centralab, Inc, Milwaukee, Wisc. 53212	83740	Union Carbide Corp, New York, N.Y. 10017
07263	Fairchild Camera, Mountain View, Calif.	71666	Continental Carbon Co, Inc, New York, N.Y.	83781	National Electronics Inc, Geneva, Ill.
07387	Birchtr Corp, No. Los Angeles, Calif.	71707	Coto Coll Co Inc, Providence, R.I.	84411	TRW Capacitor Div, Ogallala, Nebr.
07595	Amer Semicond, Arlington Hts, Ill. 60004	71744	Chicago Miniature Lamp Works, Chicago, Ill.	84835	Lahigh Metal Prods, Cambridge, Mass. 02140
07828	Bodine Corp, Bridgeport, Conn. 06605	71785	Cinch Mfg Co, Chicago, Ill. 60624	84971	TA Mfg Corp, Los Angeles, Calif.
07829	Bodine Electric Co, Chicago, Ill. 60618	71823	Darnell Corp, Ltd, Downey, Calif. 90241	86577	Precision Metal Prods, Stoneham, Mass. 02180
07910	Cont Dev Corp, Hawthorne, Calif.	72136	Electro Motive Mfg Co, Wilmington, Conn.	86684	RCA (Elect. Comp & Dev), Harrison, N.J.
07983	State Labs Inc, N.Y., N.Y. 10003	72259	Nytronics Inc, Berkeley Heights, N.J. 07922	86687	REC Corp, New Rochelle, N.Y. 10801
07999	Borg Inst., Delavan, Wisc. 53115	72619	Dialight Co, Brooklyn, N.Y. 11237	86800	Cont Electronics Corp, Brooklyn, N.Y. 11222
08730	Vemaline Prod Co, Franklin Lakes, N.J.	72699	General Instr Corp, Newark, N.J. 07104	88140	Cutler-Hammer Inc, Lincoln, Ill.
09213	G.E. Semiconductor, Buffalo, N.Y.	72765	Drake Mfg Co, Chicago, Ill. 60656	88219	Gould Nat. Batteries Inc, Trenton, N.J.
09408	Star-Tronics Inc, Georgetown, Mass. 01830	72825	Hugh H. Eby Inc, Philadelphia, Penn. 19144	88419	Cornell-Dubiller, Fuquay-Varina, N.C.
09823	Burgess Battery Co, Freeport, Ill.	72962	Elastic Stop Nut Corp, Union, N.J. 07083	88627	K & G Mfg Co, New York, N.Y.
09922	Burndy Corp, Norwalk, Conn. 06852	72982	Erle Technological Products Inc, Erie, Penn.	89482	Holtzer-Cabot Corp, Boston, Mass.
11236	C.T.S. of Berne, Inc, Berne, Ind. 46711	73138	Beckman Inc, Fullerton, Calif. 92634	89665	United Transformer Co, Chicago, Ill.
11599	Chandler Evans Corp, W. Hartford, Conn.	73445	Amperex Electronics Co, Hicksville, N.Y.	90201	Mallory Capacitor Co, Indianapolis, Ind.
12040	National Semiconductor, Danbury, Conn.	73559	Carling Electric Co, W.Hartford, Conn.	90750	Westinghouse Electric Corp, Boston, Mass.
12498	Crystalonics, Cambridge, Mass. 02140	73690	Elco Resistor Co, New York, N.Y.	90952	Hardware Products Co, Reading, Penn. 19602
12672	RCA, Woodbridge, N.J.	73899	JFD Electronics Corp, Brooklyn, N.Y.	91032	Continental Wire Corp, York, Penn. 17405
12697	Clarostat Mfg Co, Inc, Dover, N.H. 03820	74193	Heinemann Electric Co, Trenton, N.J.	91146	ITT (Cannon Electric Inc), Salem, Mass.
12954	Dickson Electronics, Scottsdale, Ariz.	74861	Industrial Condenser Corp, Chicago, Ill.	91293	Johanson Mfg Co, Boonton, N.J. 07005
13327	Soltron Devices, Tappan, N.Y. 10983	74970	E.F. Johnson Co, Waseca, Minn. 56093	91506	Augat Inc, Attleboro, Mass. 02703
14433	ITT Semiconductors, W.Palm Beach, Fla.	75042	IRC Inc, Philadelphia, Penn. 19108	91598	Chandler Co, Wethersfield, Conn. 06109
14655	Cornell-Dubiller Electric Co, Newark, N.J.	75382	Kulka Electric Corp, Mt. Vernon, N.Y.	91637	Dale Electronics Inc, Columbus, Nebr.
14674	Corning Glass Works, Corning, N.Y.	75491	Lafayette Industrial Electronics, Jamaica, N.Y.	91662	Elco Corp, Willow Grove, Penn.
14936	General Instrument Corp, Hicksville, N.Y.	75608	Linden and Co, Providence, R.I.	91719	General Instruments Inc, Dallas, Texas
15238	ITT, Semiconductor Div, Lawrence, Mass.	75915	Littelfuse, Inc, Des Plaines, Ill. 60016	91929	Honeywell Inc, Freeport, Ill.
15605	Cutler-Hammer Inc, Milwaukee, Wisc. 53233	76005	Lord Mfg Co, Erie, Penn. 16512	92518	Electra Insul Corp, Woodside, L.I., N.Y.
16037	Spruce Pine Mica Co, Spruce Pine, N.C.	76149	Mallory Electric Corp, Detroit, Mich. 48204	92678	E.G.&G., Boston, Mass.
17771	Singer Co, Diehl Div, Somerville, N.J.	76487	James Millen Mfg Co, Malden, Mass. 02148	93332	Sylvania Elect Prods, Inc, Woburn, Mass.
19396	Illinois Tool Works, Pakton Div, Chicago, Ill.	76545	Mueller Electric Co, Cleveland, Ohio 44114	93916	Cramer Products Co, New York, N.Y. 10013
19644	LRC Electronics, Horseheads, N.Y.	76584	National Tube Co, Pittsburg, Penn.	94144	Raytheon Co, Components Div, Quincy, Mass.
19701	Electra Mfg Co, Independence, Kansas 67301	76854	Oak Mfg Co, Crystal Lake, Ill.	94154	Tung Sol Electric Inc, Newark, N.J.
21335	Fafnir Bearing Co, New Briton, Conn.	77147	Patton MacGueroy Co, Providence, R.I.	95076	Garde Mfg Co, Cumberland, R.I.
22753	UID Electronics Corp, Hollywood, Fla.	77166	Pass-Seymour, Syracuse, N.Y.	95121	Quality Components Inc, St. Mary's, Penn.
23342	Avnet Electronics Corp, Franklin Park, Ill.	77263	Pierce Roberts Rubber Co, Trenton, N.J.	95146	Alco Electronics Mfg Co, Lawrence, Mass.
24446	G.E., Schenectady, N.Y. 12305	77339	Positive Lockwasher Co, Newark, N.J.	95238	Continental Connector Corp, Woodside, N.Y.
24454	G.E., Electronics Comp, Syracuse, N.Y.	77642	Ray-O-Vac Co, Madison, Wisc.	95275	Vitramon, Inc, Bridgeport, Conn.
24455	G.E. (Lamp Div), Nela Park, Cleveland, Ohio	77630	TRW, Electronic Comp, Camden, N.J. 08103	95354	Methodo Mfg Co, Chicago, Ill.
24655	General Radio Co, W. Concord, Mass. 01781	77638	General Instruments Corp, Brooklyn, N.Y.	95412	General Electric Co, Schenectady, N.Y.
26806	American Zettlet Inc, Costa Mesa, Calif.	78189	Shakeproof (Ill. Tool Works), Elgin, Ill. 60120	95794	Anaconda Amer Brass Co, Torrington, Conn.
28520	Hayman Mfg Co, Kenilworth, N.J.	78277	Sigma Instruments Inc, St. Braintree, Mass.	96095	Hi-Q Div. of Aerovox Corp, Orlean, N.Y.
28559	Hoffman Electronics Corp, El Monte, Calif.	78488	Stackpole Carbon Co, St. Marys, Penn.	96214	Texas Instruments Inc, Dallas, Texas 75209
30874	I.B.M., Armonk, New York	78553	Tinnerman Products, Inc, Cleveland, Ohio	96256	Thorderson-Melnsner, Mt. Carmel, Ill.
32001	Jensen Mfg. Co, Chicago, Ill. 60638	79089	RCA, Radio Tube & Semicond, Harrison, N.J.	96341	Microwave Associates Inc, Burlington, Mass.
33173	G.E. Comp, Owensboro, Ky. 42301	79725	Wiremold Co, Hartford, Conn. 06110	96791	Amphenol Corp, Jonesville, Wisc. 53545
35929	Constante Co, Mont. 19, Que.	80030	Zierlick Mfg Co, New Rochelle, N.Y.	96906	Military Standards
37942	P.R. Mallory & Co Inc, Indianapolis, Ind.	80048	Prestole Fastener, Toledo, Ohio	98291	Sealectro Corp, Mamaroneck, N.Y. 10544
38443	Marlin-Rockwell Corp, Jamestown, N.Y.	80131	Vickers Inc, St. Louis, Mo.	98474	Compar Inc, Burlingame, Calif.
40931	Honeywell Inc, Minneapolis, Minn. 55408	80183	Electronic Industries Assoc, Washington, D.C.	98821	North Hills Electronics Inc, Glen Cove, N.Y.
42190	Muter Co, Chicago, Ill. 60638	80211	Sprague Products Co, N. Adams, Mass.	99180	Transitron Electronics Corp, Melrose, Mass.
42498	National Co, Inc, Melrose, Mass. 02176	80258	Motorola Inc, Franklin Park, Ill. 60131	99313	Varlen, Palo Alto, Calif. 94303
43991	Norma-Hoffman, Stanford, Conn. 06904	80294	Standard Oil Co, Lafayette, Ind.	99378	Atlee Corp, Winchester, Mass. 01890
			Bourne Inc, Riverside, Calif. 92506	99800	Delevan Electronics Corp, E. Aurora, N.Y.

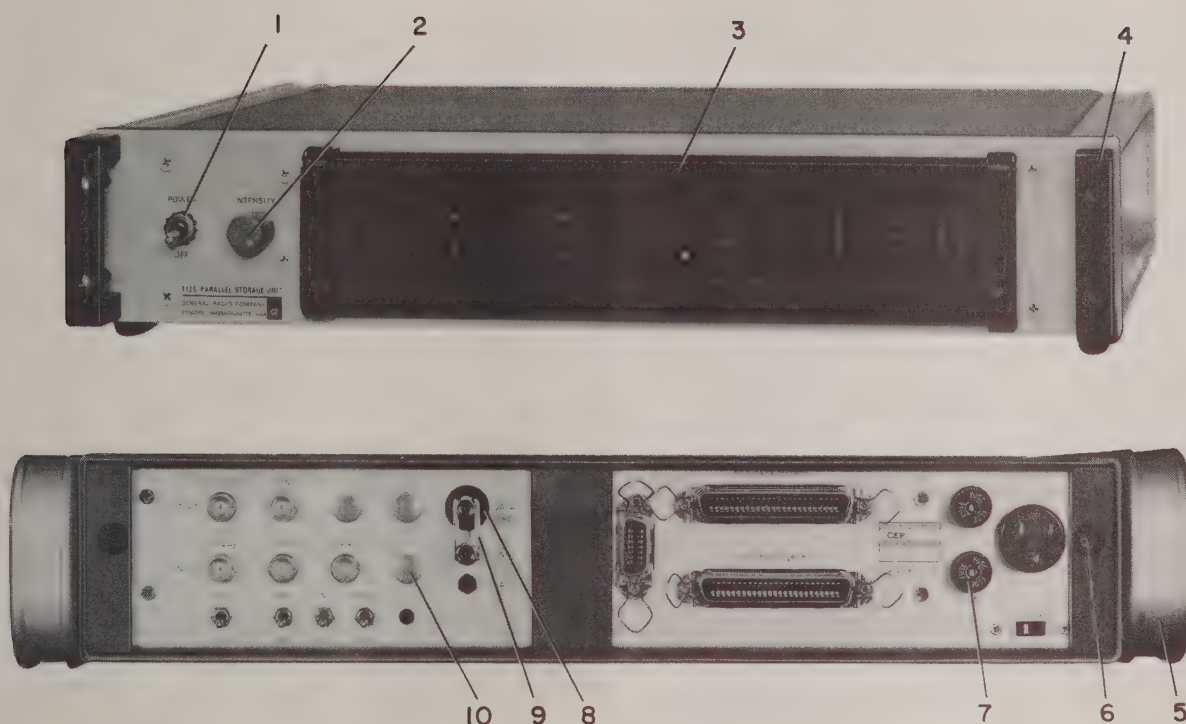


Figure 6-1. Replaceable mechanical parts.

MECHANICAL PARTS LIST

Figure 6-1 Reference	Name	Description	Part No.	Fed Mfg. Code	Mfg. Part No.	Fed Stock No.
1	DRESS NUT	POWER-OFF switch dress nut	5800-0800	24655	5800-0800	5310-344-3634
2	KNOB	Marked knob with white dot and line	5520-5221	24655	5520-5221	
	BUSHING	Metal bushing	4143-3121	24655	4143-3121	
3	WINDOW FRAME ASSEMBLY	Includes No. 8-32, 1/8-inch set screw	7250-0600	24655	7250-0600	5305-570-8936
4	HANDLE	Bezel including marked window	1125-2000	24655	1125-2000	
5	END-FRAME SET	Handle for front panel, 2 required	5360-2007	24655	5360-2007	
6	CABINET SCREW	Bench mounting end-frame with feet	5310-9624	24655	5310-9624	
7	FUSE HOLDER	Alternate rack-support set	7863-9624	24655	7863-9624	
8	INSULATOR	Phillips-head, No. 10-32, 5/8-inch screw	7270-6210	24655	7270-6210	
9	SHORTING LINK	Extractor-type fuse holder, 2 required	5650-0100	71400	HKP-H	5920-284-7144
10	SNAP BUTTON	Black-insulator pair for binding post	0938-9818	24655	0938-9818	
		Nickel-plated brass shorting link	0938-9712	24655	0938-9712	5940-562-3507
		Covers extra switch holes in rear panel, 3 required	4160-0100	83058	BS-48192	

SIGNAL INDEX

Signal	Description	Signal Type	Reference Figure 6-
BBAS	FF1 Q Output	dc	2, 16
BBBS	FF1 SD Input	pulse	2
BCA	FF2 Q Output	dc	2, 8
BCI	FF2 $\bar{Q}$ Output	dc	2, 16
BDA	FF3 Q Output	dc	2
BDI	FF3 $\bar{Q}$ Output	dc	2, 8
DATA 0	Reference Level	dc	3
DATA 1	Reference Level	dc	3, 16
GAH	300-ms Delay Generator Output	pulse	2, 8
GHE	50- μ s Delay Generator Output	dc	2
GHED	DATA READY	dc	2, 8
GKEP	PRINT COMMAND	dc	2, 8
INHIBIT	INHIBIT Input	dc	2, 14
PGEC	5- μ s Delay Generator Input	pulse	2, 16
PGIC	5- μ s Delay Generator Output	pulse	2
PHEI	Inhibit Input to Program Gate	dc	2, 16
PHFC	Program Gate Output	pulse	2, 16
PJF	Inverter Output	pulse	2, 16
PKF	Inverter Output	pulse	2, 16
PLEN	Pulse Generator Output	dc	2, 16
PLEP	Pulse Generator Output	dc	2, 16
S1L	Indicator Driver Input	dc	10
S2L	Indicator Driver Input	dc	10
S3L	Indicator Driver Input	dc	10
S4L	Indicator Driver Input	dc	10
SBAC	Input 100-kHz Flip-Flop Q Output	dc	2, 14
SBIC	Input 100-kHz Flip-Flop $\bar{Q}$ Output	dc	2, 14
SCAS	Input STORE Flip-Flop Q Output	dc	2, 14
SCIS	Input STORE Flip-Flop $\bar{Q}$ Output	dc	2, 14
SDAI	Input INHIBIT Flip-Flop Q Output	dc	2, 14
SDII	Input INHIBIT Flip-Flop $\bar{Q}$ Output	dc	2, 14
STORE	STORE Input	pulse	2, 14
0 REF	Zero Reference	dc	3, 8, 10
+0.6 V	Reference Level	dc	8, 16
+3 V	Reference Level	dc	8, 16
+14 V	Power Supply Voltage	dc and rms	3, 10
+15 V	Power Supply Voltage	dc	3, 8
100 kHz	100-kHz Input	dc	2, 14

100

5

IN

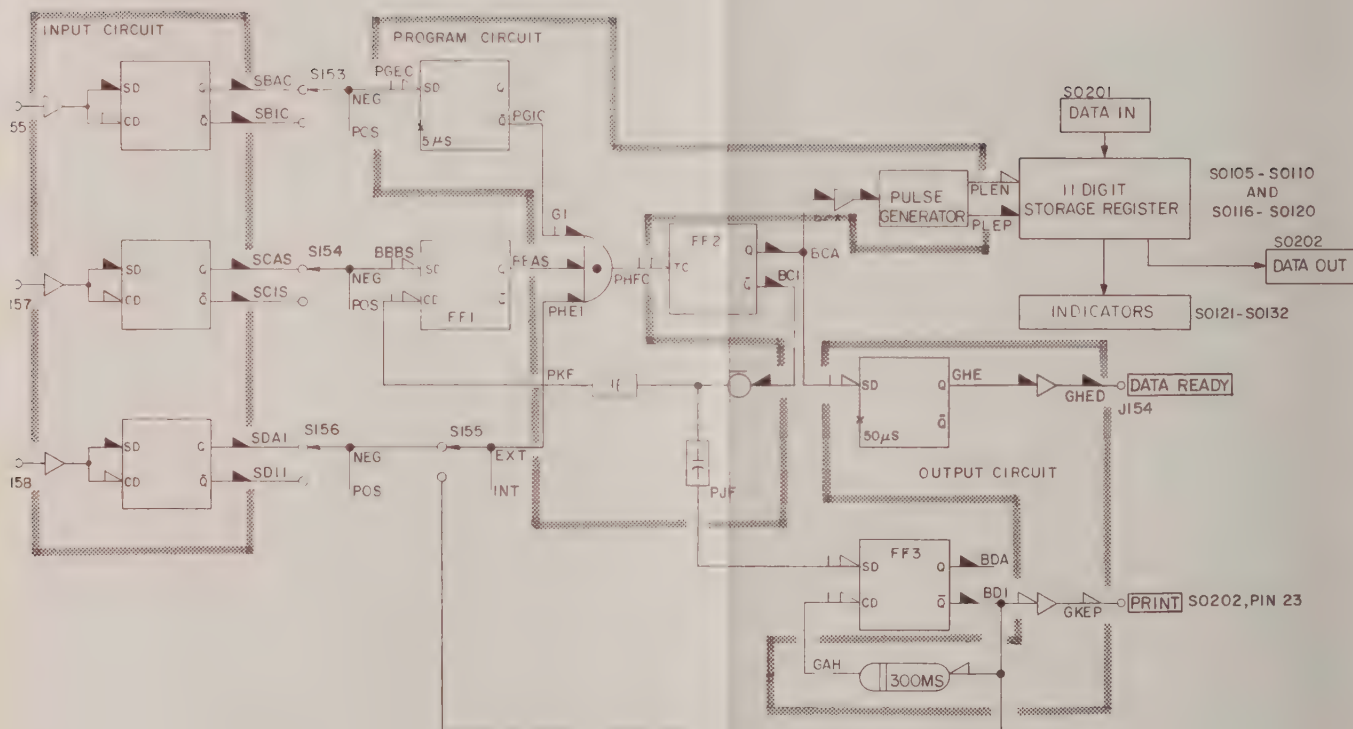
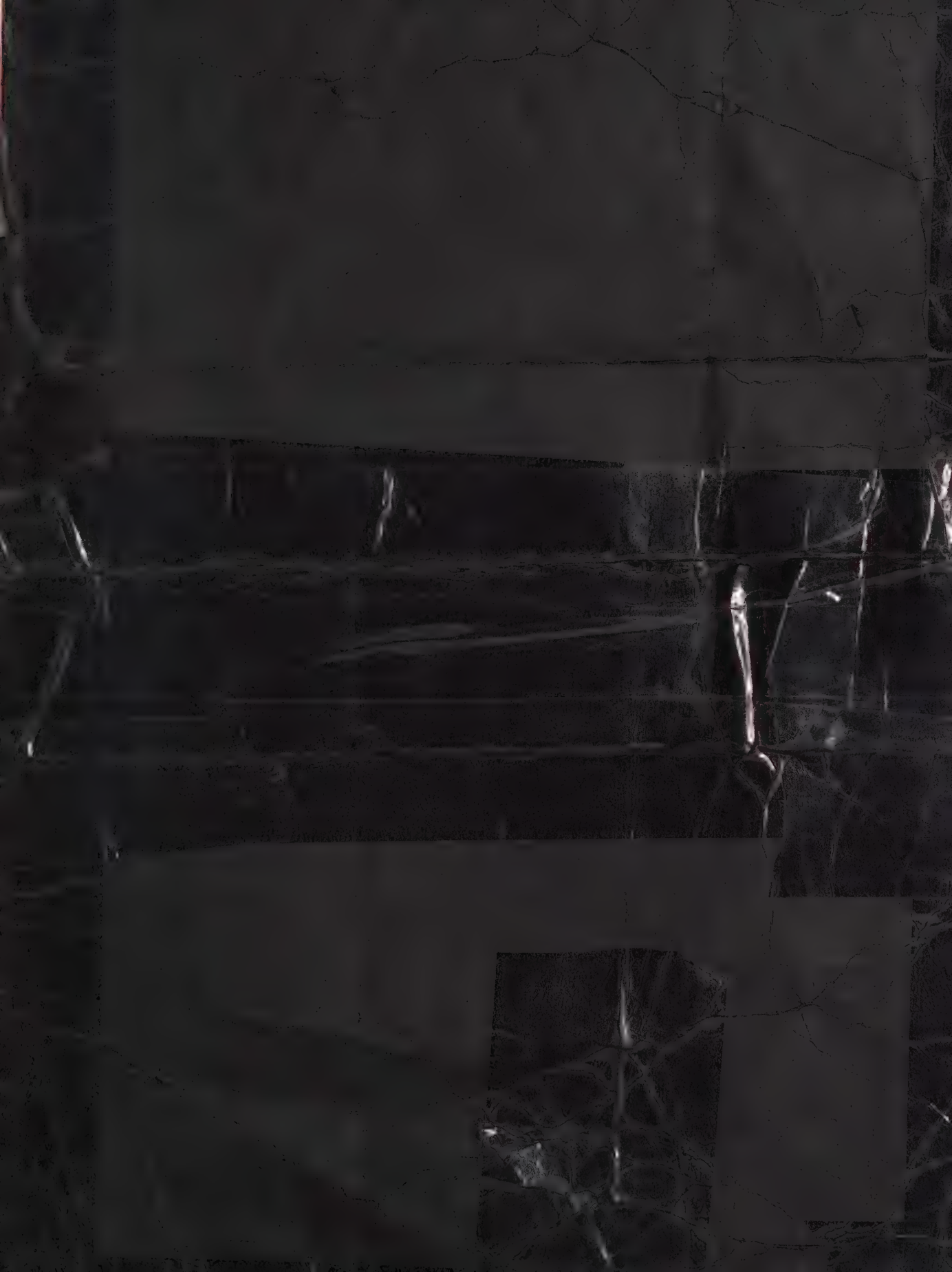
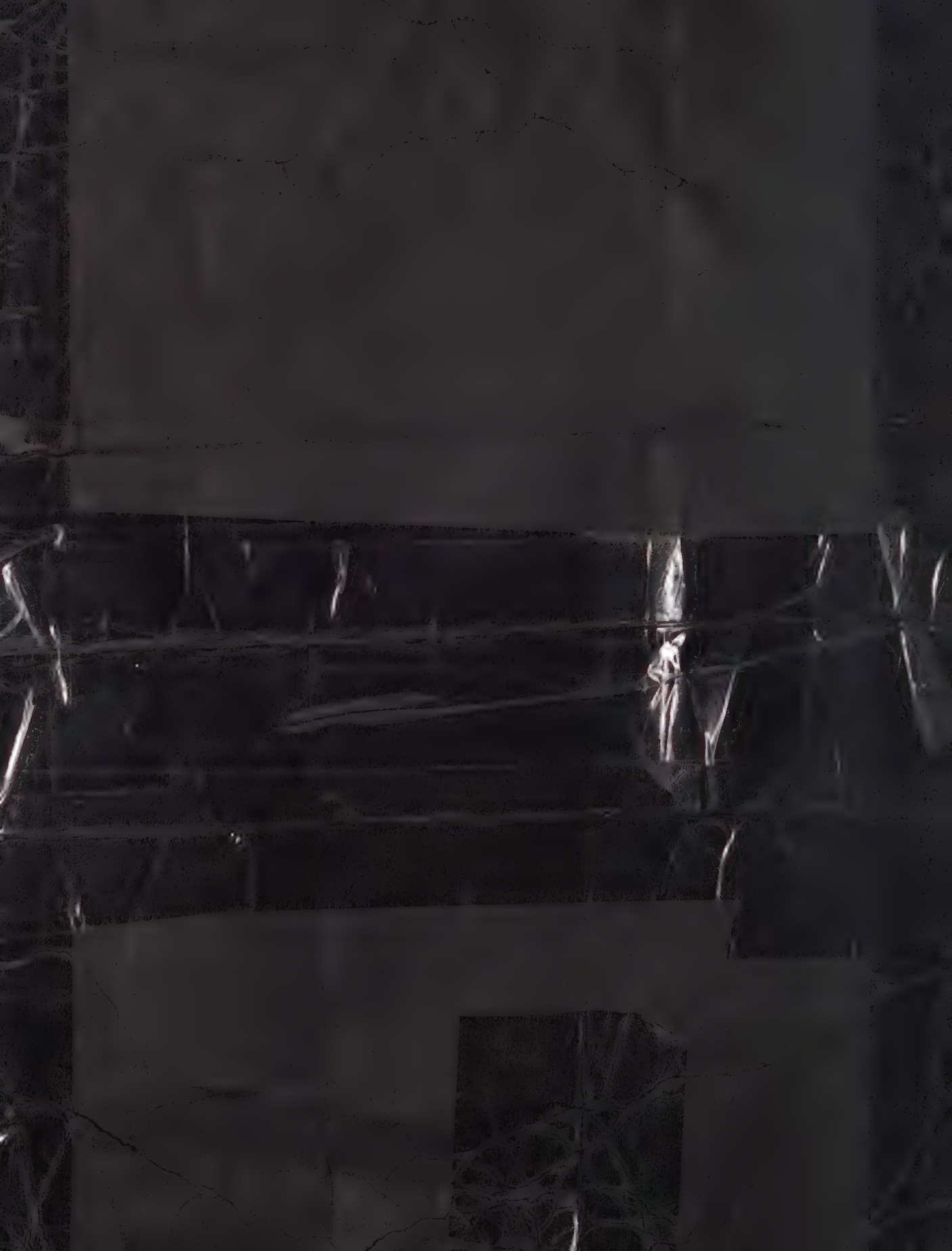


Figure 6-2. Logic diagram for Type 1125 Parallel-Storage Unit.





Ref. No.	Description	Part No.	Fed. Mfg. Code	Mfg. Part No.	Fed Stock No.
C151A	CAPACITOR, Electrolytic 300 μ F 35 V	4450-2400	37942	2021149S4C10X1	5910-822-2691
C151B	CAPACITOR, Electrolytic 300 μ F 35 V	4450-2400	37942	2021149S4C10X1	5910-822-2691
C152A	CAPACITOR, Electrolytic 300 μ F 35 V	4450-2400	37942	2021149S4C10X1	5910-822-2691
C152B	CAPACITOR, Electrolytic 300 μ F 35 V	4450-2400	37942	2021149S4C10X1	5910-822-2691
C153	CAPACITOR, Ceramic 47 pF $\pm$ 10% 500 V	4404-0478	72982	831, 47 pF $\pm$ 10%	
J151	JACK	4260-0600	91506	8040-1G4A	
J152	JACK	0938-3000	24655	0938-3000	
J153	JACK	0938-3013	24655	0938-3013	
J154	JACK	4230-2300	81349	UG-1094/U	
J155	JACK	4230-2300	81349	UG-1094/U	
J156	JACK	4230-2300	81349	UG-1094/U	
J157	JACK	4230-2300	81349	UG-1094/U	
J158	JACK	4230-2300	81349	UG-1094/U	
PL151	PLUG	4240-0600	24655	4240-0600	
R151	RESISTOR, Variable 100 Ω $\pm$ 10%	6020-0050	24655	6020-0050	5905-188-1535
R152	RESISTOR, Variable 0.47 Ω $\pm$ 10% 2 W	6760-8479	75042	BWH, 0.47 Ω $\pm$ 10%	
R153	RESISTOR, Variable 0.47 Ω $\pm$ 10% 2 W	6760-8479	75042	BWH, 0.47 Ω $\pm$ 10%	
R154	RESISTOR, Variable 10 k Ω $\pm$ 5% 1/4 W	6099-3105	75042	BTS, 10 k Ω $\pm$ 5%	
Q151	TRANSISTOR, Type 2N1540	8210-1540	80211	2N1540	
Q152	TRANSISTOR, Type 2N1540	8210-1540	80211	2N1540	
T151	TRANSFORMER	0345-4160	24655	0345-4160	
T152	TRANSFORMER	0345-4160	24655	0345-4160	
F151	FUSE, 0.25A	5330-0700	71400	MDL, 0.25A	5920-933-5435
F152	FUSE, 0.125A	5330-0450	71400	MDL, 0.125A	5920-284-9455
S151	SWITCH	7910-1300	04009	83053-SA	5930-909-3510
S152	SWITCH	7910-0831	42190	4603	
S153	SWITCH	7910-0790	95146	MST-105D	
S154	SWITCH	7910-0790	95146	MST-105D	
S155	SWITCH	7910-0790	95146	MST-105D	
S156	SWITCH	7910-0790	95146	MST-105D	
SO102	SOCKET	4230-2724	95354	91-6024-1201-00	
SO105	SOCKET	4230-2724	95354	91-6024-1201-00	
SO106	SOCKET	4230-2724	95354	91-6024-1201-00	
SO107	SOCKET	4230-2724	95354	91-6024-1201-00	
SO108	SOCKET	4230-2724	95354	91-6024-1201-00	
SO109	SOCKET	4230-2724	95354	91-6024-1201-00	
SO110	SOCKET	4230-2724	95354	91-6024-1201-00	
SO111	SOCKET	4230-2724	95354	91-6024-1201-00	
SO112	SOCKET	4230-2724	95354	91-6024-1201-00	
SO113	SOCKET	4230-2724	95354	91-6024-1201-00	
SO114	SOCKET	4230-2724	95354	91-6024-1201-00	
SO116	SOCKET	4230-2724	95354	91-6024-1201-00	
SO117	SOCKET	4230-2724	95354	91-6024-1201-00	
SO118	SOCKET	4230-2724	95354	91-6024-1201-00	
SO119	SOCKET	4230-2724	95354	91-6024-1201-00	
SO120	SOCKET	4230-2724	95354	91-6024-1201-00	
SO121	SOCKET	4230-2706	95354	CD606SF	
SO122	SOCKET	4230-2706	95354	CD606SF	
SO123	SOCKET	4230-2706	95354	CD606SF	
SO124	SOCKET	4230-2706	95354	CD606SF	
SO125	SOCKET	4230-2706	95354	CD606SF	
SO127	SOCKET	4230-2706	95354	CD606SF	
SO128	SOCKET	4230-2706	95354	CD606SF	
SO129	SOCKET	4230-2706	95354	CD606SF	
SO130	SOCKET	4230-2706	95354	CD606SF	
SO131	SOCKET	4230-2706	95354	CD606SF	
SO132	SOCKET	4230-2706	95354	CD606SF	
SO133	SOCKET	4230-2710	95354	91-6010-1201-00	
SO134	SOCKET	4230-2710	95354	91-6010-1201-00	
SO201	SOCKET	4230-4049	93916	57-40500	
SO202	SOCKET	4230-4049	93916	57-40500	
SO203	SOCKET	4230-4014	93916	57-40140	

1. POSITION OF ROTARY SWITCHES SHOWN COUNTERCLOCKWISE.
2. CONTACT NUMBERING OF SWITCHES EXPLAINED ON SEPARATE SHEET SUPPLIED IN INSTRUCTION BOOK.
3. REFER TO SERVICE NOTES IN INSTRUCTION BOOK FOR VOLTAGES APPEARING ON DIAGRAM.
4. RESISTORS 2 WATT.
5. RESISTANCE IN OHMS
K - 1000 OHMS M - 1 MEGOHM
6. CAPACITANCE VALUES ONE AND OVER IN PICO FARADS LESS THAN ONE IN MICROFARADS.
7. KNOB CONTROL
8. SCREWDRIVER CONTROL
9. AT - ANCHOR TERMINAL
10. TP - TEST POINT

The schematic diagram illustrates the power supply system for the 151 and 152 units. It begins with a power source labeled PL151, which is connected to a transformer T152. The transformer has multiple secondary windings, each with a different number of turns (8, 7, 6, 5) and a center tap (4). The output of the transformer is connected to a series of switches (WH-BR, WH-OR, WH-VT, WH-RD, WH-VT, WH-GY, WH-GN) and fuses (F151, F152). The transformer also has a 50-60 Hz and a 100-125 Hz rating. The output is connected to a 50-60 Hz transformer (T152) and a 100-125 Hz transformer (T152). The output is connected to a 50-60 Hz transformer (T152) and a 100-125 Hz transformer (T152).



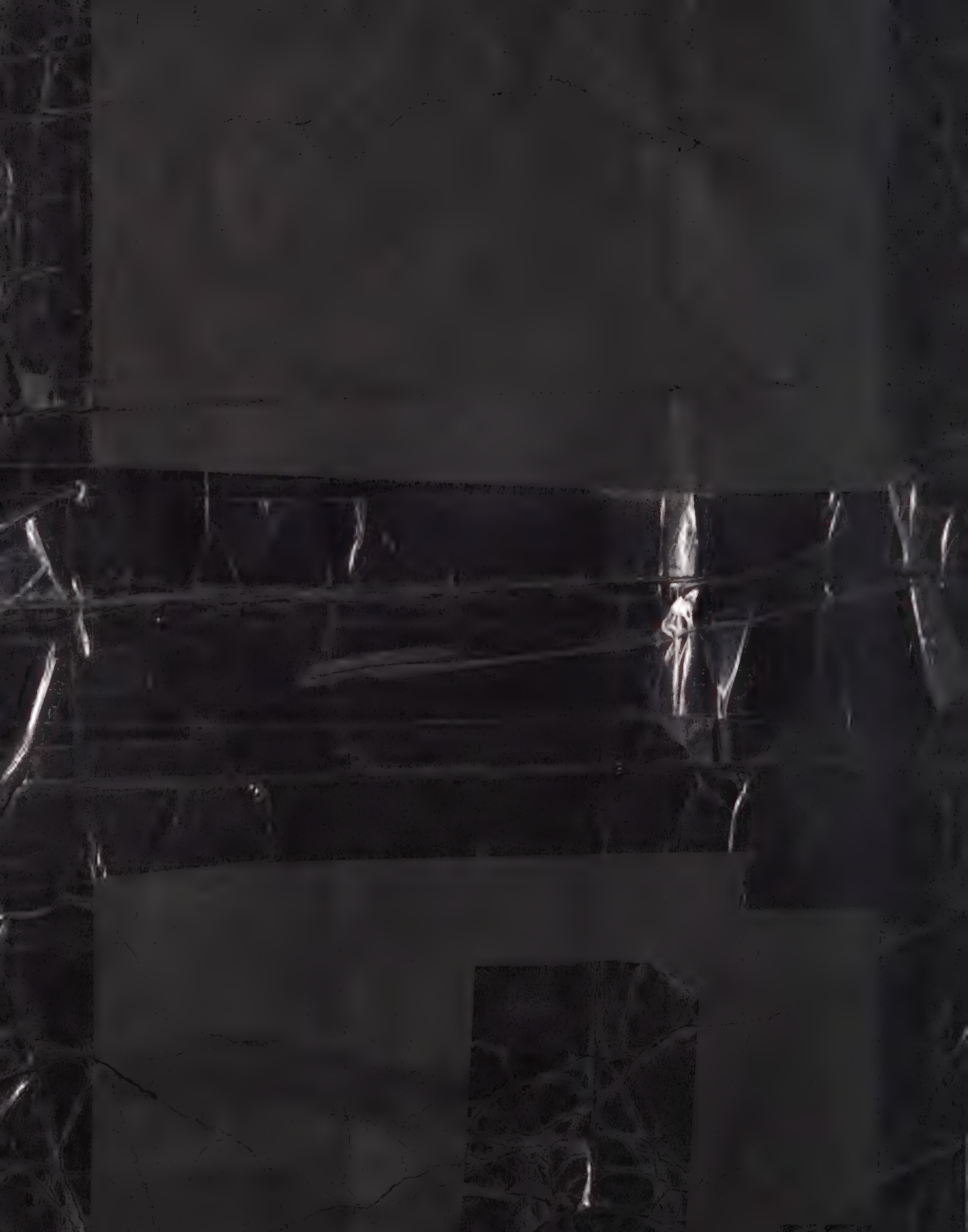
	COLOR CODE
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- A = 1125-0200
- B = 1125-0210
- C = 1125-0220
- D = 1125-0230
- E = 1125-0240
- F = 1125-0250
- G = BK
- H = BR
- I = RD
- J = OR
- K = YE
- L = GN
- M = BU
- N = VT
- O = GY
- P = WH

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2	S0103	S0104	1125-4730 S0105 1 SEC.	1125-4730 S0106 10 SEC.	1125-4730 S0107 1 MIN.	1125-4730 S0108 10 MIN.	1125-4730 S0109 1 HR.	1125-4730 S0110 10 HR.	1125-4740 S0111 INPUT CIRCUIT
			+ 15	+ 15 C162A	+ 15	+ 15	+ 15	+ 15	+ 15
			2	2 D-0	2	2	2	2 D-0	2
			OREF	OREF C152 CASE	OREF	OREF	OREF	OREF S0120,2	NC
			3 B-940	3 B-930	3 B-970	3 B-980	3 B-920	3 B-90	3
			S1 IN S0201,11	S1 IN S0201,13	S1 IN S0201,15	S1 IN S0201,17	S1 IN S0201,19	S1 IN S0201,21	NC
			4 D-940	4 D-930	4 D-970	4 D-980	4 D-920	4 D-90	4
			SIL S0127,1	SIL S0128,1	SIL S0129,1	SIL S0130,1	SIL S0131,1	SIL S0132,1	NC
			5 A-940	5 A-930	5 A-970	5 A-980	5 A-920	5 A-90	5 F-D
			SID S0202,11	SID S0202,13	SID S0202,15	SID S0202,17	SID S0202,19	SID S0202,21	OREF S0111,24
			6	6	6	6	6	6	6 BUS
			NC	NC	NC	NC	NC	NC	IN J158
			7 B-941	7 B-931	7 B-971	7 B-981	7 B-921	7 B-91	7
			S2 S0201,12 IN	S2 S0201,14 IN	S2 S0201,16 IN	S2 S0201,18 IN	S2 S0201,20 IN	S2 S0201,22 IN	NC
			8 D-941	8 D-931	8 D-971	8 D-981	8 D-921	8 D-91	8 BUS
			S2 L S0127,5	S2 L S0128,5	S2 L S0129,5	S2 L S0130,5	S2 L S0131,5	S2 L S0132,5	S D I S156,3
			9 A-941	9 A-931	9 A-971	9 A-981	9 A-921	9 A-91	9
			S2 D S0202,12	S2 D S0202,14	S2 D S0202,16	S2 D S0202,18	S2 D S0202,20	S2 D S0202,22	NC
			10 BUS	10	10	10	10	10 D-1	10 BUS
			+ 10	+ 10	+ 10	+ 10	+ 10	+ 10 S0120,10	S D A S156,1
			11	11	11	11	11	11	11
			NC	NC	NC	NC	NC	NC	NC
			12 B-946	12 B-936	12 B-976	12 B-986	12 B-926	12 B-96	12 BUS
			S3 S0201,36 IN	S3 S0201,38 IN	S3 S0201,40 IN	S3 S0201,42 IN	S3 S0201,44 IN	S3 S0201,46 IN	S D I J157
			13 D-946	13 D-936	13 D-976	13 D-986	13 D-926	13 D-96	13
			S3 L S0127,2	S3 L S0128,2	S3 L S0129,2	S3 L S0130,2	S3 L S0131,2	S3 L S0132,2	NC
			14 A-946	14 A-936	14 A-976	14 A-986	14 A-926	14 A-96	14 BUS
			S3 D S0202,36	S3 D S0202,38	S3 D S0202,40	S3 D S0202,42	S3 D S0202,44	S3 D S0202,46	S C I S154,3
			15	15	15	15	15	15	15
			NC	NC	NC	NC	NC	NC	NC
			16	16	16	16	16	16	16
			NC	NC	NC	NC	NC	NC	NC
			17 B-945	17 B-935	17 B-975	17 B-985	17 B-925	17 B-95	17 BUS
			S4 S0201,37 IN	S4 S0201,39 IN	S4 S0201,41 IN	S4 S0201,43 IN	S4 S0201,45 IN	S4 S0201,47 IN	S C A S154,1
			18 D-945	18 D-935	18 D-975	18 D-985	18 D-925	18 D-95	18
			S4 L S0127,4	S4 L S0128,4	S4 L S0129,4	S4 L S0130,4	S4 L S0131,4	S4 L S0132,4	NC
			19 A-945	19 A-935	19 A-975	19 A-985	19 A-925	19 A-95	19
			S4 D S0202,37	S4 D S0202,39	S4 D S0202,41	S4 D S0202,43	S4 D S0202,45	S4 D S0202,47	NC
			20	20	20	20	20	20	20 BUS
			NC	NC	NC	NC	NC	NC	100 KHz J155
			21	21	21	21	21	21	21
			NC	NC	NC	NC	NC	NC	NC
			22 BUS	22	22	22	22	22 BUS	22 BUS
			P L P	P L P	P L P	P L P	P L P	P L P S0120,22	S B I S153,3
			23	23	23	23	23	23	23 BUS
				NC	NC	NC	NC	NC	S B A C S153,1
			24 BUS	24	24	24	24	24	24 F-D
			P L N	P L N	P L N	P L N	P L N	P L N S0120,24	OREF S0111,5



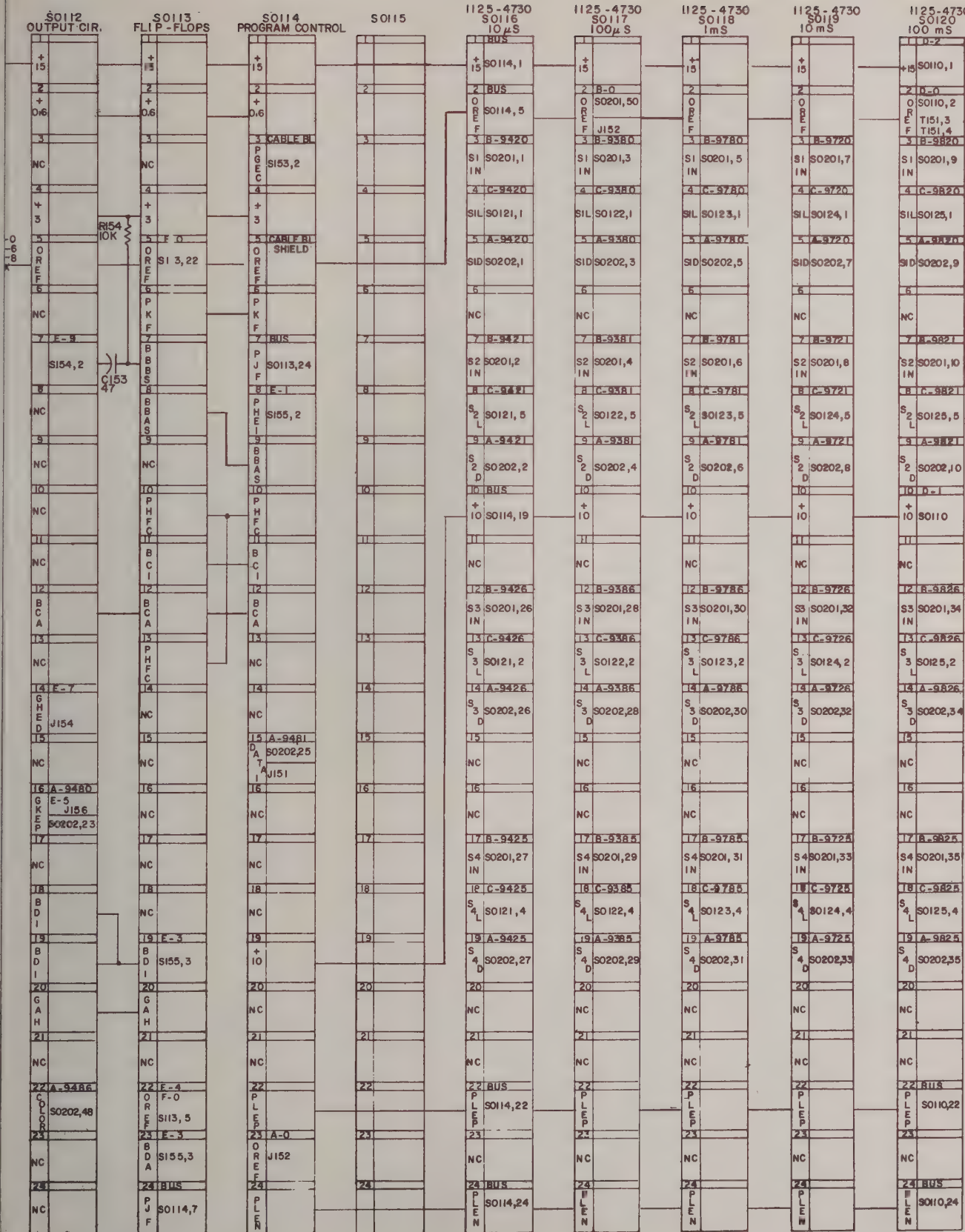


Figure 6-4. Connections for 24-pin sockets.

SOI21
1125 - 47

1	C-94
S I L	SOI16
2	C-94
S 3 L	SOI16
3	
+	
14	
4	C-94
S 4 L	SOI16
5	C-94
S 2 L	SOI16
6	
G N D	

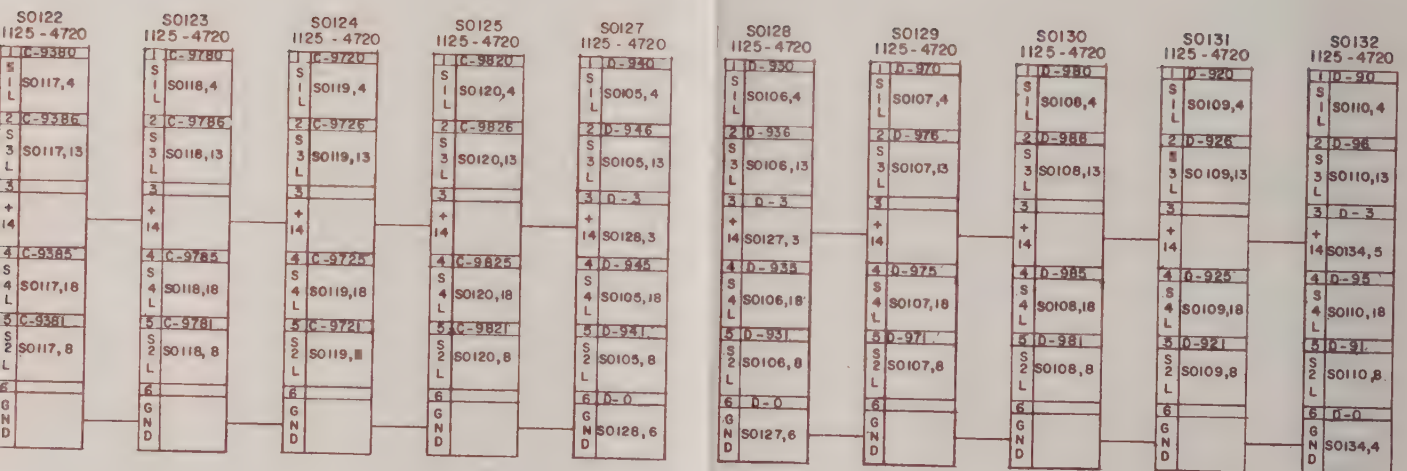
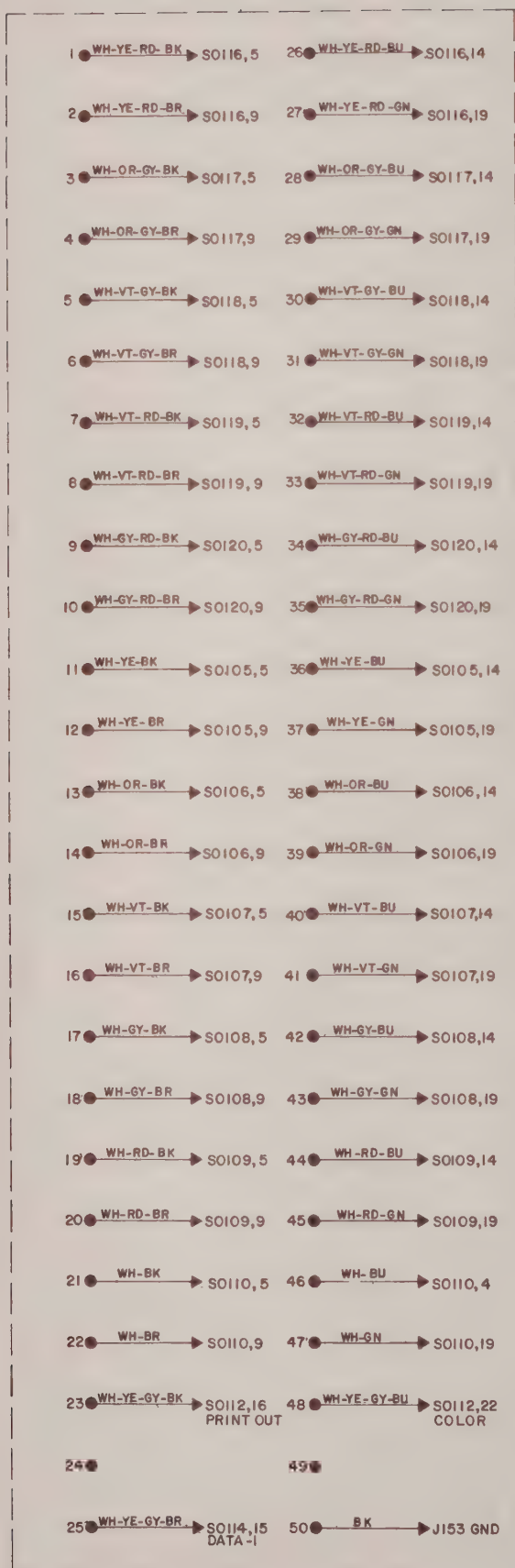
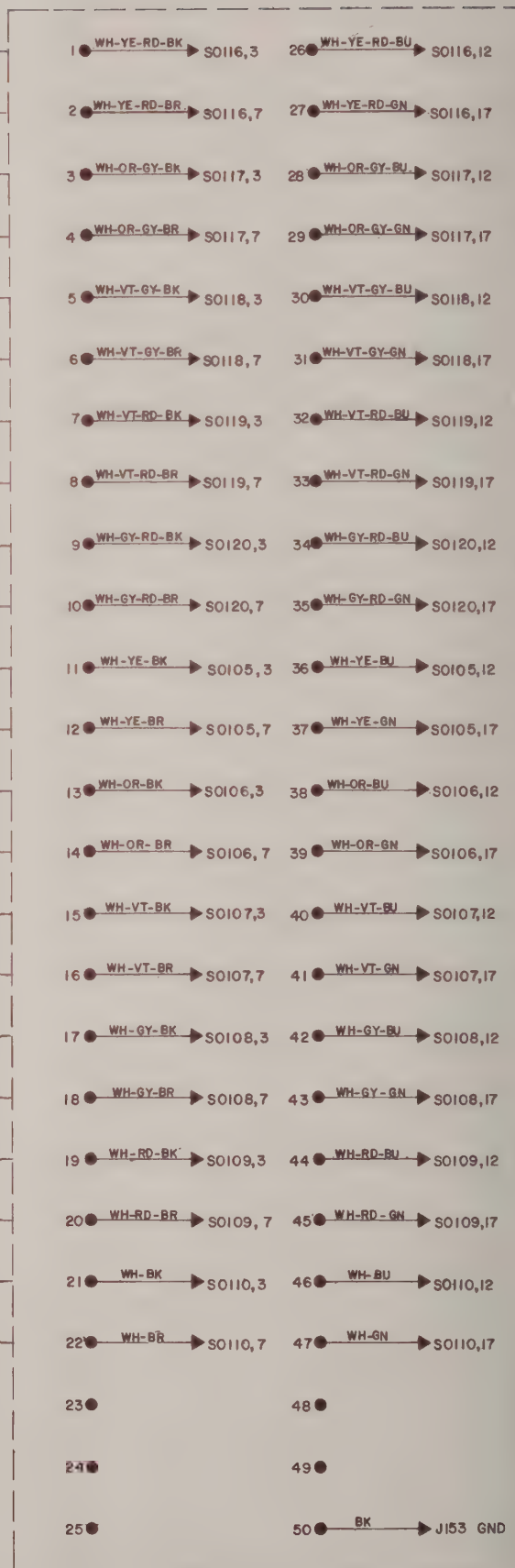


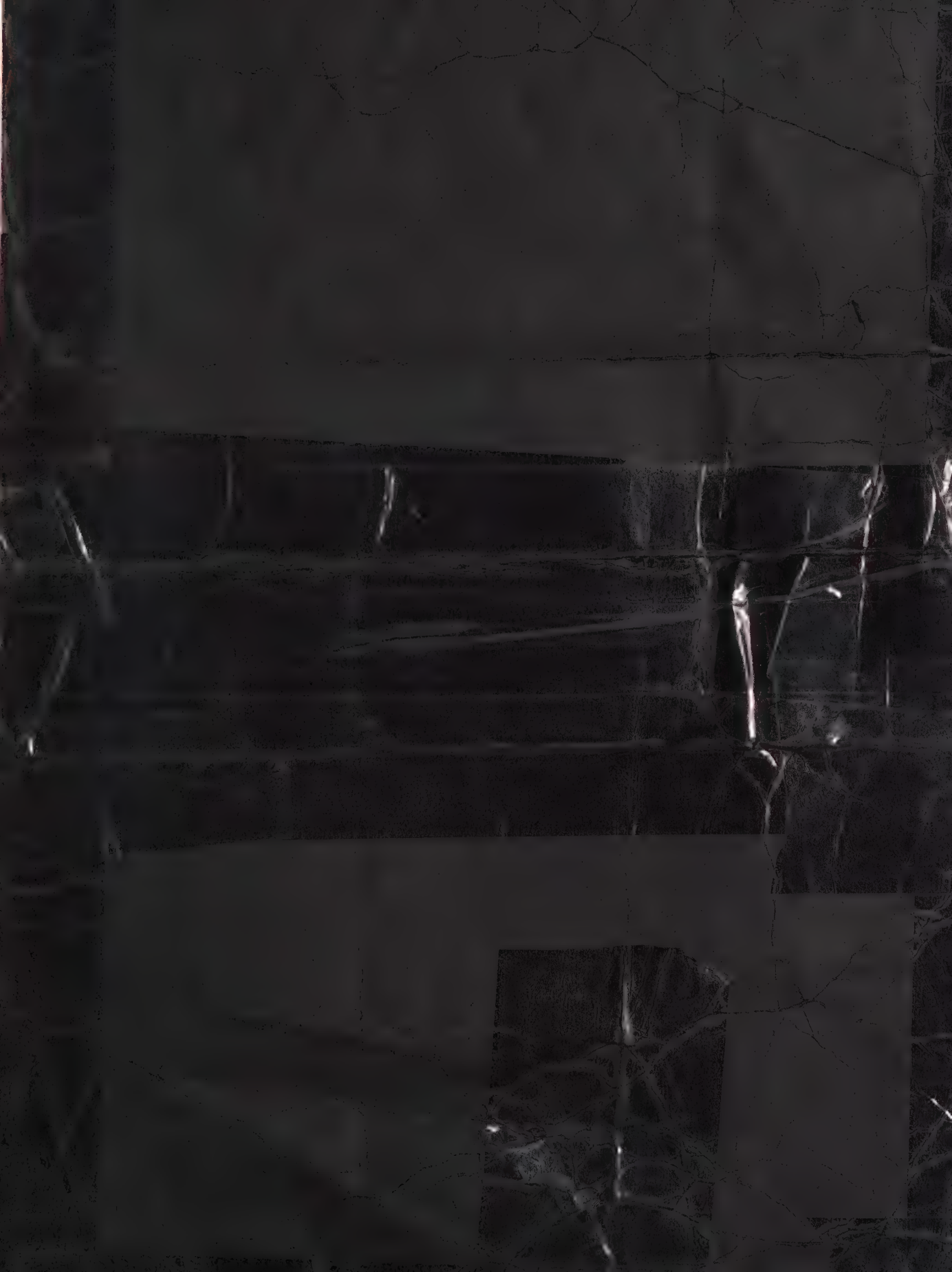
Figure 6-5. Connections for 6-pin sockets.

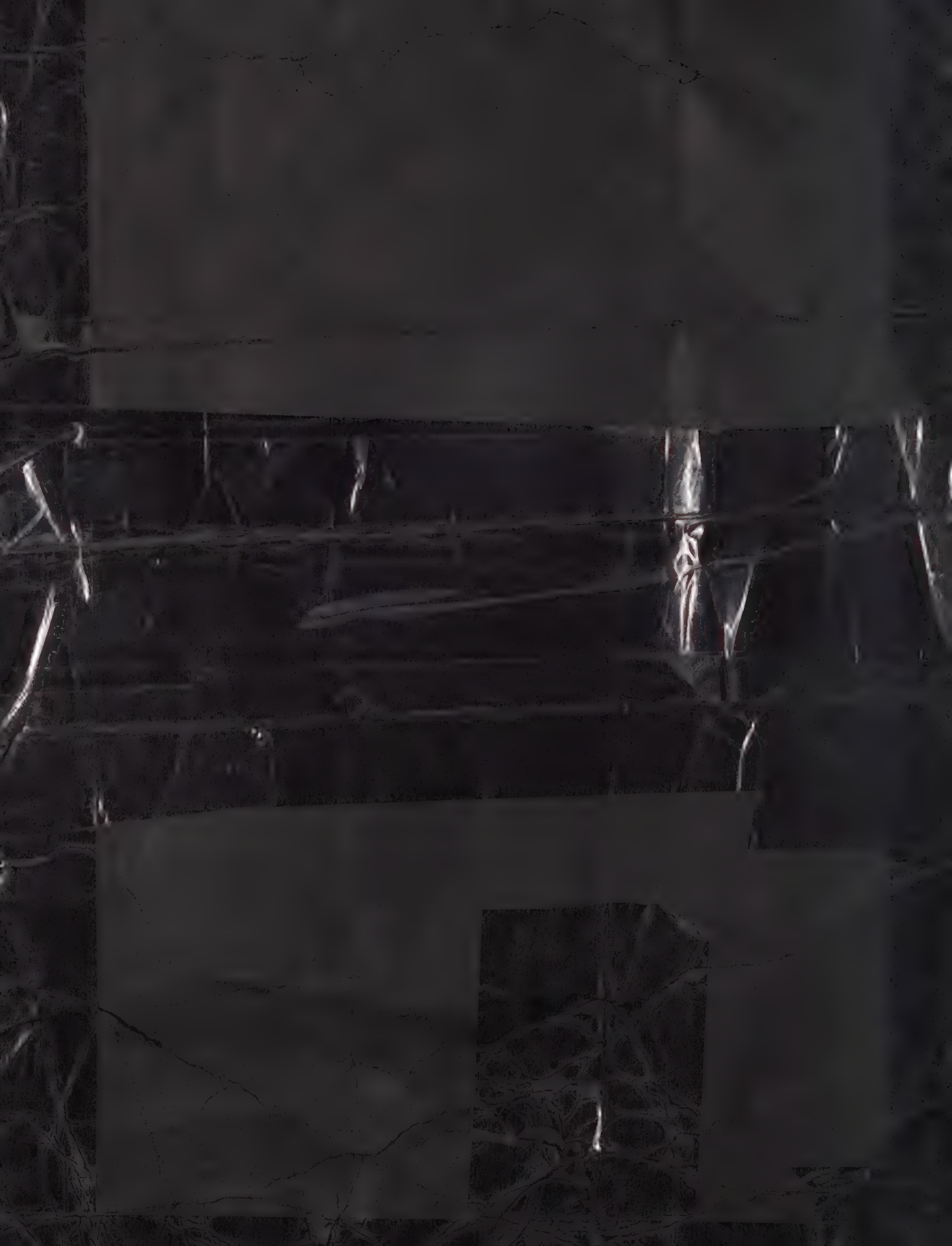


SO202 DIGITAL OUTPUT SOCKET CONNECTIONS



SO201 DIGITAL INPUT SOCKET CONNECTIONS





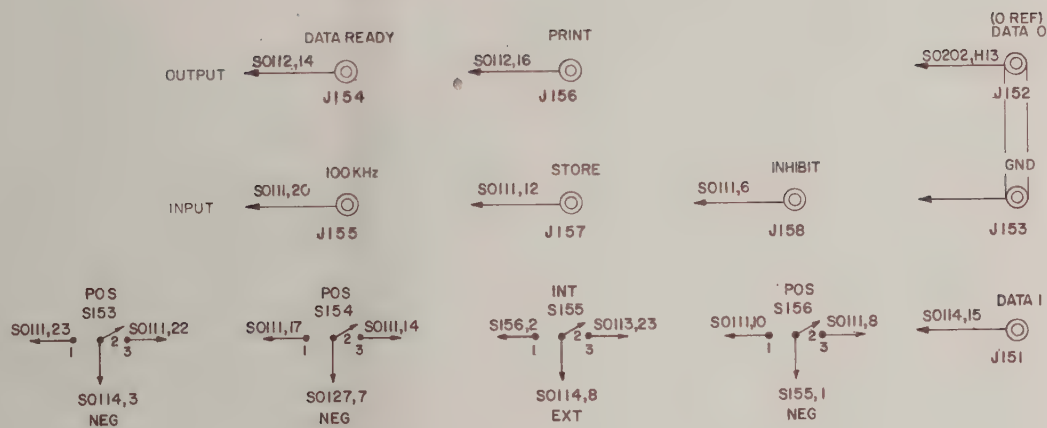


Figure 6-6. Connections for input and output jacks and sockets.

Ref. No.	Description	Part No.	Fed. Mfg. Code	Mfg. Part No.	Fed. Stock No.
C101	CAPACITOR, Mica, 0.001 μ F $\pm$ 2% 500 V	4700-0684	14655	22A, 0.001 μ F $\pm$ 2%	
C102	CAPACITOR, Ceramic, 180 pF $\pm$ 10% 500 V	4404-1188	72982	831, 180 pF $\pm$ 10%	
C103	CAPACITOR, Ceramic, 68 pF $\pm$ 10% 500 V	4404-0688	72982	831, 68 pF $\pm$ 10%	
C104	CAPACITOR, Plastic, 0.22 μ F $\pm$ 2% 100 V	4860-7950	84411	663UW, 0.22 μ F $\pm$ 2%	
C105	CAPACITOR, Ceramic, 120 pF $\pm$ 10% 500 V	4404-1128	72982	831, 120 pF $\pm$ 10%	
C106	CAPACITOR, Ceramic, 68 pF $\pm$ 10% 500 V	4404-0688	72982	831, 68 pF $\pm$ 10%	
C107	CAPACITOR, Ceramic, 100 pF $\pm$ 10% 500 V	4404-1108	72982	831, 100 pF $\pm$ 10%	
C108	CAPACITOR, Ceramic, 680 pF $\pm$ 5% 500 V	4404-1685	72982	831, 680 pF $\pm$ 5%	
R101	RESISTOR, Composition, 27 k Ω $\pm$ 5% 1/4 W	6099-3275	75042	BTS, 27 k Ω $\pm$ 5%	
R102	RESISTOR, Composition, 1 k Ω $\pm$ 5% 1/4 W	6099-2105	75042	BTS, 1 k Ω $\pm$ 5%	
R103	RESISTOR, Composition, 1 k Ω $\pm$ 5% 1/4 W	6099-2105	75042	BTS, 1 k Ω $\pm$ 5%	
R104	RESISTOR, Composition, 7.5 k Ω $\pm$ 5% 1/4 W	6099-2755	75042	BTS, 7.5 k Ω $\pm$ 5%	
R105	RESISTOR, Composition, 3.3 k Ω $\pm$ 5% 1/4 W	6099-2335	75042	BTS, 3.3 k Ω $\pm$ 5%	
R106	RESISTOR, Composition, 68 k Ω $\pm$ 5% 1/4 W	6099-3685	75042	BTS, 68 k Ω $\pm$ 5%	
R107	RESISTOR, Composition, 3.3 k Ω $\pm$ 5% 1/4 W	6099-2335	75042	BTS, 3.3 k Ω $\pm$ 5%	
R108	RESISTOR, Composition, 27 k Ω $\pm$ 5% 1/4 W	6099-3275	75042	BTS, 27 k Ω $\pm$ 5%	
R109	RESISTOR, Composition, 27 k Ω $\pm$ 5% 1/4 W	6099-3275	75042	BTS, 27 k Ω $\pm$ 5%	
R110	RESISTOR, Composition, 20 k Ω $\pm$ 5% 1/4 W	6099-3205	75042	BTS, 20 k Ω $\pm$ 5%	
R111	RESISTOR, Variable, 2.5 M Ω $\pm$ 10%	6046-5258	01121	P13R63	
R112	RESISTOR, Composition, 3.3 k Ω $\pm$ 5% 1/4 W	6099-2335	75042	BTS, 3.3 k Ω $\pm$ 5%	
R113	RESISTOR, Composition, 10 k Ω $\pm$ 5% 1/4 W	6099-3105	75042	BTS, 10 k Ω $\pm$ 5%	
R114	RESISTOR, Composition, 27 k Ω $\pm$ 5% 1/4 W	6099-3275	75042	BTS, 27 k Ω $\pm$ 5%	
R115	RESISTOR, Composition, 5.1 k Ω $\pm$ 5% 1/4 W	6099-2515	75042	BTS, 5.1 k Ω $\pm$ 5%	5905-279-4623
R116	RESISTOR, Composition, 10 k Ω $\pm$ 5% 1/4 W	6099-3105	75042	BTS, 10 k Ω $\pm$ 5%	
R117	RESISTOR, Composition, 10 k Ω $\pm$ 5% 1/4 W	6099-3105	75042	BTS, 10 k Ω $\pm$ 5%	
R118	RESISTOR, Composition, 5.1 k Ω $\pm$ 5% 1/4 W	6099-2515	75042	BTS, 5.1 k Ω $\pm$ 5%	5905-279-4623
R119	RESISTOR, Composition, 10 k Ω $\pm$ 5% 1/4 W	6099-3105	75042	BTS, 10 k Ω $\pm$ 5%	
R120	RESISTOR, Composition, 100 k Ω $\pm$ 5% 1/4 W	6099-4105	75042	BTS, 100 k Ω $\pm$ 5%	
Q101	TRANSISTOR, Type 2N3702	8210-1106	01295	2N3702	
Q102	TRANSISTOR, Type 2N3416	8210-1047	24446	2N3414	5961-989-2749
Q103	TRANSISTOR, Type 2N3416	8210-1047	24446	2N3414	5961-989-2749
Q104	TRANSISTOR, Type 2N3702	8210-1106	01295	2N3702	
Q105	TRANSISTOR, Type 2N2713	8210-1086	03508	2N2713	
Q106	TRANSISTOR, Type 2N2713	8210-1086	03508	2N2713	
Q107	TRANSISTOR, Type 2N3416	8210-1047	24446	2N3414	
Q108	TRANSISTOR, Type 2N3702	8210-1106	01295	2N3702	
Q109	TRANSISTOR, Type 2N4123	8210-1123	93916	2N1423	
CR101	DIODE, Type 1N4009	6082-1012	24446	1N4009	
CR102	DIODE, Type 1N4009	6082-1012	24446	1N4009	
CR103	DIODE, Type 1N4009	6082-1012	24446	1N4009	

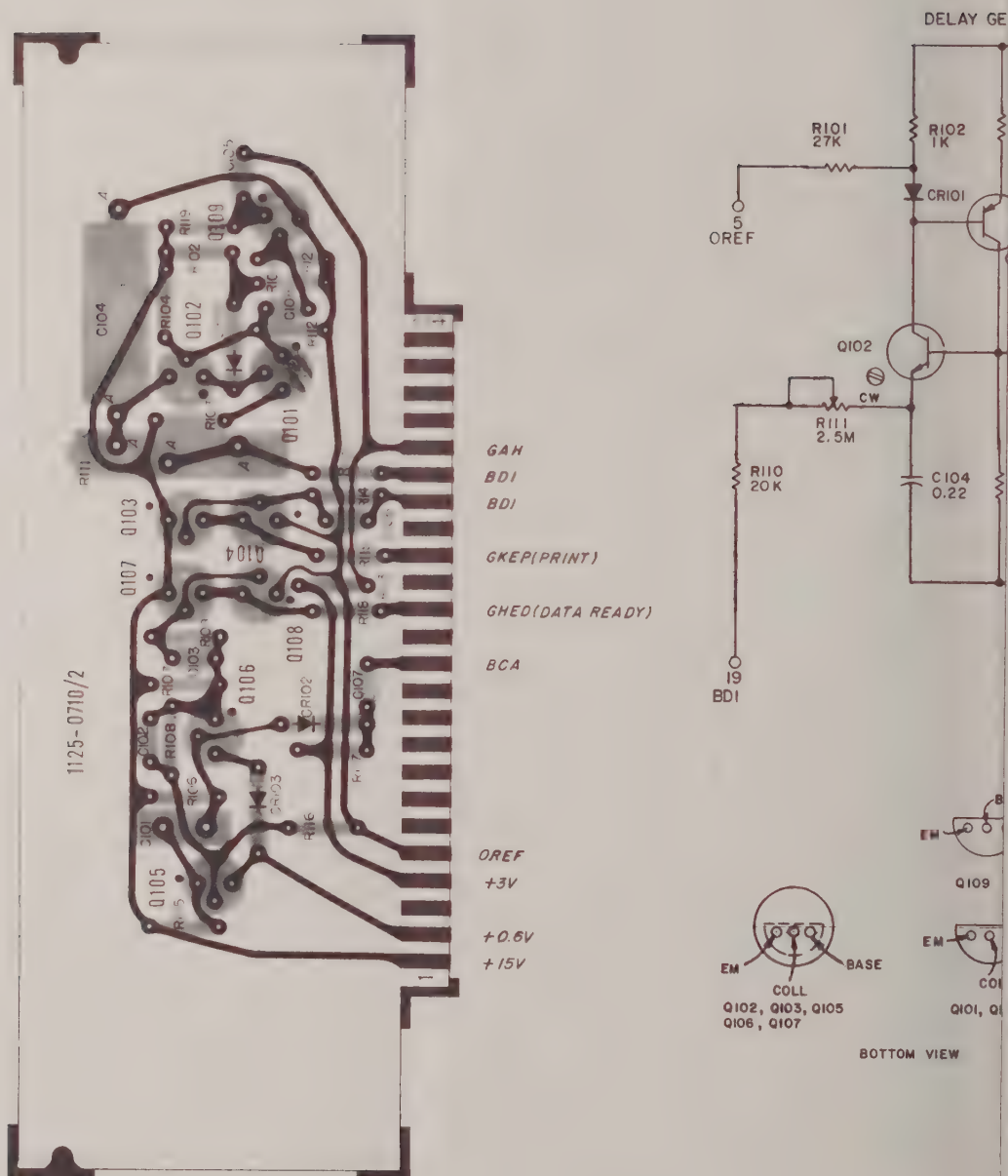
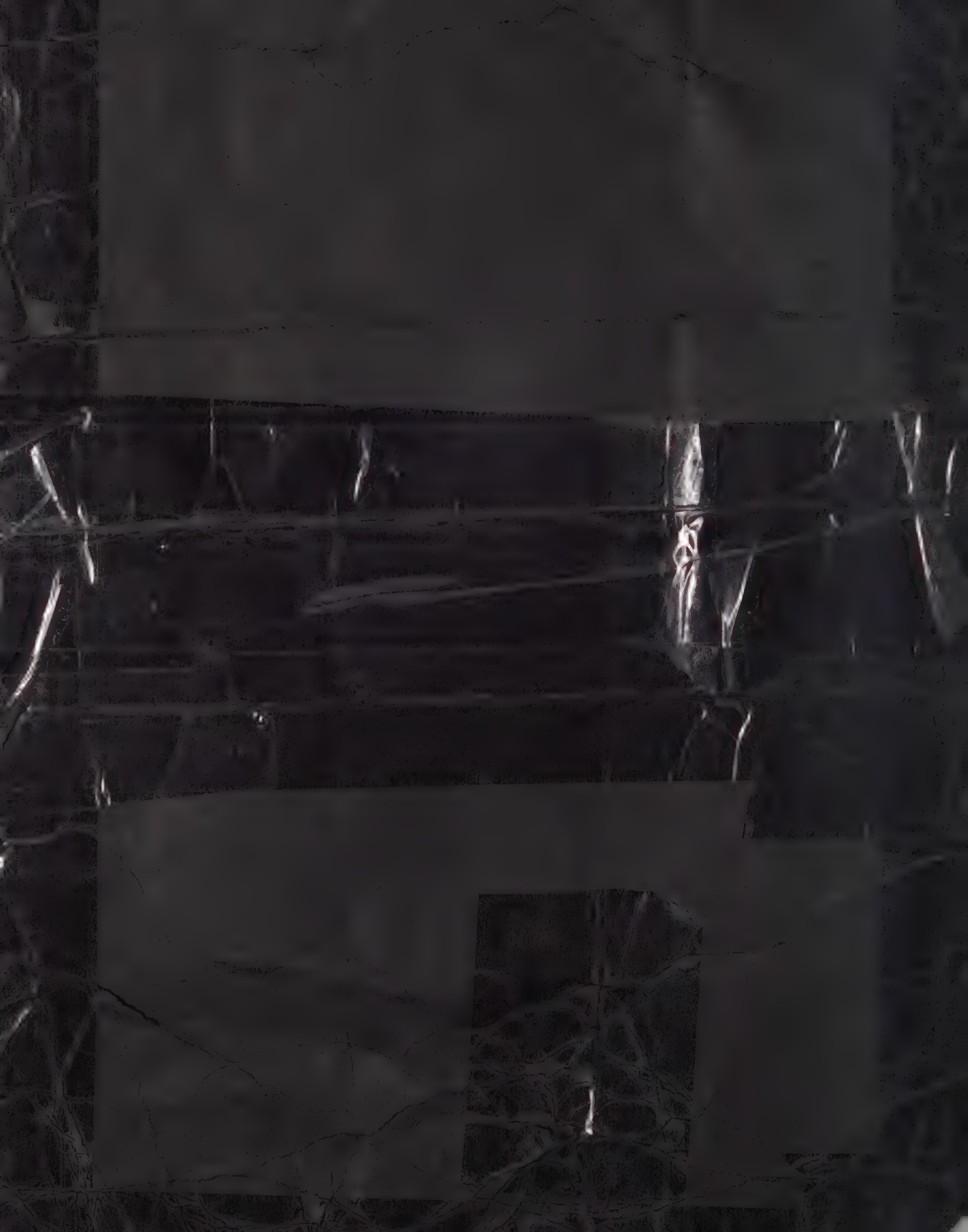
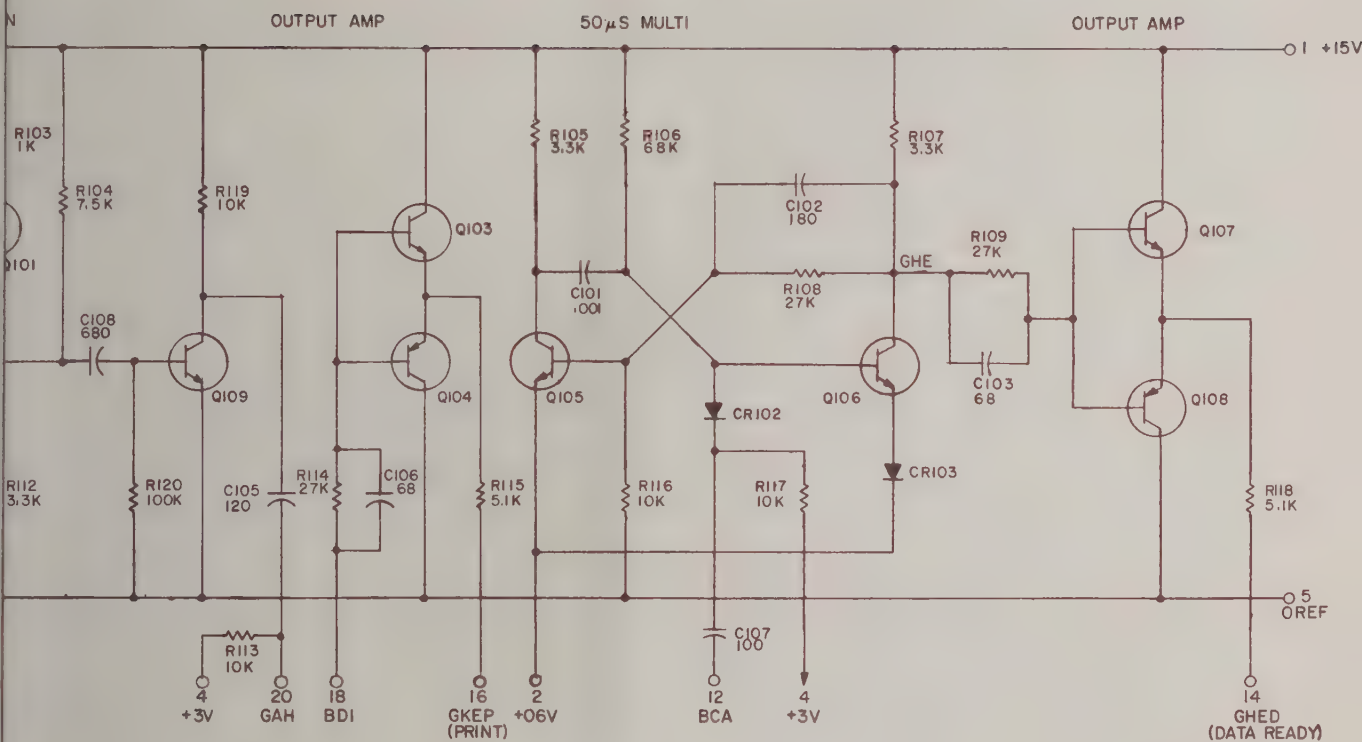


Figure 6-7. Output circuit etched-board assembly (P/N 1125-4711).

NOTE: The number appearing on the foil side is not the part number. The dot on the foil at the transistor socket indicates the collector lead.

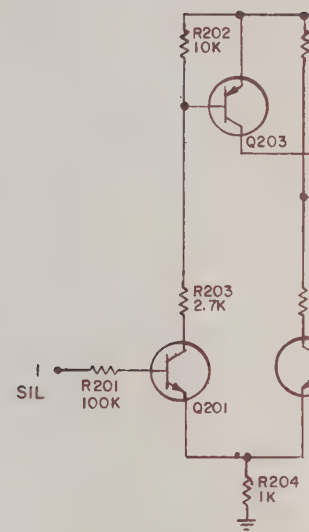




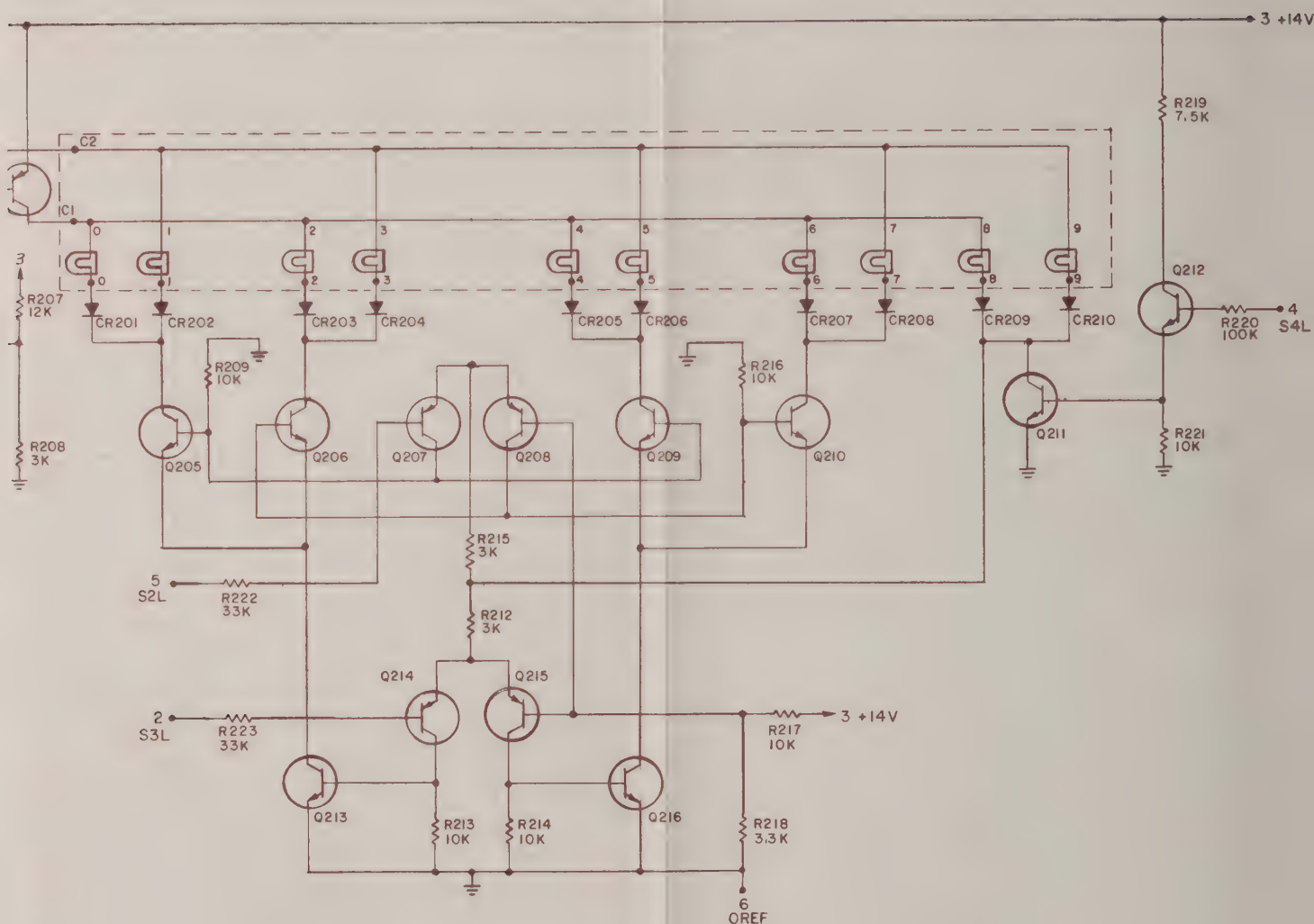
- NOTE UNLESS SPECIFIED**

1. POSITION OF ROTARY SWITCHES SHOWN COUNTERCLOCKWISE. 2. CONTACT NUMBERING OF SWITCHES EXPLAINED ON EXPANDED SHEET SUPPLIED IN INSTRUCTION BOOK. 3. REFER TO SERVICE NOTES IN INSTRUCTION BOOK FOR VOLTAGES APPEARING ON DIAGRAM. 4. RESISTORS 1/4 WATT.	5. RESISTANCE IN OHMS K = 1000 OHMS M = 1 MEGOHM 6. CAPACITANCE VALUES ONE AND OVER IN PICOFARADS, LESS THAN ONE IN MICROFARADS. 7.  KNOB CONTROL 8.  SCREWDRIIVER CONTROL 9. AT - ANCHOR TERMINAL 10. TP - TEST POINT
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Ref. No.	Description	Part No.	Fed. Mfg. Code	Mfg. Part No.	Fed. Stock No.
CR201	DIODE, Type 1N645	6082-1016	24446	1N645	5961-944-8222
CR202	DIODE, Type 1N645	6082-1016	24446	1N645	5961-944-8222
CR203	DIODE, Type 1N645	6082-1016	24446	1N645	5961-944-8222
CR204	DIODE, Type 1N645	6082-1016	24446	1N645	5961-944-8222
CR205	DIODE, Type 1N645	6082-1016	24446	1N645	5961-944-8222
CR206	DIODE, Type 1N645	6082-1016	24446	1N645	5961-944-8222
CR207	DIODE, Type 1N645	6082-1016	24446	1N645	5961-944-8222
CR208	DIODE, Type 1N645	6082-1016	24446	1N645	5961-944-8222
CR209	DIODE, Type 1N645	6082-1016	24446	1N645	5961-944-8222
CR210	DIODE, Type 1N645	6082-1016	24446	1N645	5961-944-8222
R201	RESISTOR, Composition, 100 k Ω $\pm$ 10% 1/4 W	6099-4109	75042	BTS, 100 k Ω $\pm$ 5%	
R202	RESISTOR, Composition, 10 k Ω $\pm$ 10% 1/4 W	6099-3109	75042	BTS, 10 k Ω $\pm$ 5%	
R203	RESISTOR, Composition, 2.7 k Ω $\pm$ 10% 1/4 W	6099-2279	75042	BTS, 2.7 k Ω $\pm$ 10%	
R204	RESISTOR, Composition, 1 k Ω $\pm$ 10% 1/4 W	6099-2109	75042	BTS, 1 k Ω $\pm$ 10%	
R205	RESISTOR, Composition, 10 k Ω $\pm$ 10% 1/4 W	6099-3109	75042	BTS, 10 k Ω $\pm$ 10%	
R206	RESISTOR, Composition, 3.3 k Ω $\pm$ 10% 1/4 W	6099-2339	75042	BTS, 3.3 k Ω $\pm$ 10%	
R207	RESISTOR, Composition, 12 k Ω $\pm$ 10% 1/4 W	6099-3129	75042	BTS, 12 k Ω $\pm$ 10%	
R208	RESISTOR, Composition, 3 k Ω $\pm$ 5% 1/4 W	6099-2305	75042	BTS, 3 k Ω $\pm$ 5%	
R209	RESISTOR, Composition, 10 k Ω 10% 1/4 W	6099-3109	75042	BTS, 10 k Ω $\pm$ 10%	
R212	RESISTOR, Composition, 3 k Ω $\pm$ 5% 1/4 W	6099-2305	75042	BTS, 3 k Ω $\pm$ 5%	
R213	RESISTOR, Composition, 10 k Ω $\pm$ 10% 1/4 W	6099-3109	75042	BTS, 10 k Ω $\pm$ 10%	
R214	RESISTOR, Composition, 10 k Ω $\pm$ 10% 1/4 W	6099-3109	75042	BTS, 10 k Ω $\pm$ 10%	
R215	RESISTOR, Composition, 3 k Ω $\pm$ 5% 1/4 W	6099-2305	75042	BTS, 3 k Ω $\pm$ 5%	
R216	RESISTOR, Composition, 10 k Ω $\pm$ 10% 1/4 W	6099-3109	75042	BTS, 10 k Ω $\pm$ 10%	
R217	RESISTOR, Composition, 10 k Ω $\pm$ 10% 1/4 W	6099-3109	75042	BTS, 10 k Ω $\pm$ 10%	
R218	RESISTOR, Composition, 3.3 k Ω $\pm$ 10% 1/4 W	6099-2339	75042	BTS, 3.3 k Ω $\pm$ 10%	
R219	RESISTOR, Composition, 7.5 k Ω $\pm$ 5% 1/4 W	6099-2755	75042	BTS, 7.5 k Ω $\pm$ 5%	
R220	RESISTOR, Composition, 100 k Ω $\pm$ 10% 1/4 W	6099-4109	75042	BTS, 100 k Ω $\pm$ 10%	
R221	RESISTOR, Composition, 10 k Ω $\pm$ 10% 1/4 W	6099-3109	75042	BTS, 10 k Ω $\pm$ 10%	
R222	RESISTOR, Composition, 33 k Ω $\pm$ 10% 1/4 W	6099-3339	75042	BTS, 33 k Ω $\pm$ 10%	
R223	RESISTOR, Composition, 33 k Ω $\pm$ 10% 1/4 W	6099-3339	75042	BTS, 33 k Ω $\pm$ 10%	
Q201	TRANSISTOR, Type 2N3416	8210-1047	24446	2N3414	5961-989-2749
Q202	TRANSISTOR, Type 2N3416	8210-1047	24446	2N3414	5961-989-2749
Q203	TRANSISTOR, Type 2N3702	8210-1106	01295	2N3702	
Q204	TRANSISTOR, Type 2N3702	8210-1106	01295	2N3702	
Q205	TRANSISTOR, Type 2N3416	8210-1047	24446	2N3414	
Q206	TRANSISTOR, Type 2N3416	8210-1047	24446	2N3414	5961-989-2749
Q207	TRANSISTOR, Type 2N3702	8210-1106	01295	2N3702	5961-989-2749
Q208	TRANSISTOR, Type 2N3702	8210-1106	01295	2N3702	
Q209	TRANSISTOR, Type 2N3416	8210-1047	24446	2N3414	
Q210	TRANSISTOR, Type 2N3416	8210-1047	24446	2N3414	5961-989-2749
Q211	TRANSISTOR, Type 2N3416	8210-1047	24446	2N3414	5961-989-2749
Q212	TRANSISTOR, Type 2N3416	8210-1047	24446	2N3414	5961-989-2749
Q213	TRANSISTOR, Type 2N3416	8210-1047	24446	2N3414	5961-989-2749
Q214	TRANSISTOR, Type 2N3702	8210-1106	01295	2N3702	5961-989-2749
Q215	TRANSISTOR, Type 2N3702	8210-1106	01295	2N3702	
Q216	TRANSISTOR, Type 2N3416	8210-1047	24446	2N3414	5961-989-2749



NOTE: The number appearing on the foil side is not the part number. The dot on the foil at the transistor socket indicates the collector lead.



NOTE UNLESS SPECIFIED

- | | |
|---|--|
| <ol style="list-style-type: none"> 1. POSITION OF ROTARY SWITCHES SHOWN COUNTERCLOCKWISE. 2. CONTACT NUMBERING OF SWITCHES EXPLAINED ON SEPARATE SHEET SUPPLIED IN INSTRUCTION BOOK. 3. REFER TO SERVICE NOTES IN INSTRUCTION BOOK FOR VOLTAGES, APPEARING ON DIAGRAM. 4. RESISTORS 1/4 WATT. | <ol style="list-style-type: none"> 5. RESISTANCE IN OHMS
K - 1000 OHMS M - 1 MEGOHM 6. CAPACITANCE VALUES ONE AND OVER IN PICOFARADS, LESS THAN ONE IN MICROFARADS. 7. KNOB CONTROL 8. SCREWDRIVER CONTROL 9. AT - ANCHOR TERMINAL 10. TP - TEST POINT |
|---|--|

Figure 6-10. Indicator driver schematic diagram.

Ref. No.	Description		Fed. Mfg. Code	Mfg. Part No.	Fed. Stock No.
C301	CAPACITOR, Ceramic, 0.001 μ F $\pm$ 10% 500 V	4405-2108	72982	801, 0.001 μ F $\pm$ 10%	
C302	CAPACITOR, Ceramic, 0.001 μ F $\pm$ 10% 500 V	4405-2108	72982	801, 0.001 μ F $\pm$ 10%	
C303	CAPACITOR, Ceramic, 0.001 μ F $\pm$ 10% 500 V	4405-2108	72982	801, 0.001 μ F $\pm$ 10%	
C304	CAPACITOR, Ceramic, 0.001 μ F $\pm$ 10% 500 V	4405-2108	72982	801, 0.001 μ F $\pm$ 10%	
CR301	DIODE, Type 1N4009	6082-1012	24446	1N4009	
CR302	DIODE, Type 1N4009	6082-1012	24446	1N4009	
CR303	DIODE, Type 1N4009	6082-1012	24446	1N4009	
CR304	DIODE, Type 1N4009	6082-1012	24446	1N4009	
CR305	DIODE, Type 1N4009	6082-1012	24446	1N4009	
CR306	DIODE, Type 1N4009	6082-1012	24446	1N4009	
CR307	DIODE, Type 1N4009	6082-1012	24446	1N4009	
CR308	DIODE, Type 1N4009	6082-1012	24446	1N4009	
CR309	DIODE, Type 1N4009	6082-1012	24446	1N4009	
CR310	DIODE, Type 1N4009	6082-1012	24446	1N4009	
CR311	DIODE, Type 1N4009	6082-1012	24446	1N4009	
CR312	DIODE, Type 1N4009	6082-1012	24446	1N4009	
R301	RESISTOR, Composition, 10 k Ω $\pm$ 5% 1/4 W	6099-3105	75042	BTS, 10 k Ω $\pm$ 5%	
R302	RESISTOR, Composition, 51 k Ω $\pm$ 5% 1/4 W	6099-3515	75042	BTS, 51 k Ω $\pm$ 5%	5905-200-6731
R303	RESISTOR, Composition, 51 k Ω $\pm$ 5% 1/4 W	6099-3515	75042	BTS, 51 k Ω $\pm$ 5%	5905-200-6731
R304	RESISTOR, Composition, 18 k Ω $\pm$ 5% 1/4 W	6099-3185	75042	BTS, 18 k Ω $\pm$ 5%	
R305	RESISTOR, Composition, 1 k Ω $\pm$ 5% 1/4 W	6099-2105	75042	BTS, 1 k Ω $\pm$ 5%	
R306	RESISTOR, Composition, 100 k Ω $\pm$ 5% 1/4 W	6099-4105	75042	BTS, 100 k Ω $\pm$ 5%	
R307	RESISTOR, Composition, 51 k Ω $\pm$ 5% 1/4 W	6099-3515	75042	BTS, 51 k Ω $\pm$ 5%	5905-200-6731
R308	RESISTOR, Composition, 1 k Ω $\pm$ 5% 1/4 W	6099-2105	75042	BTS, 1 k Ω $\pm$ 5%	
R309	RESISTOR, Composition, 20 k Ω $\pm$ 5% 1/4 W	6099-3205	75042	BTS, 20 k Ω $\pm$ 5%	
R310	RESISTOR, Composition, 6.8 k Ω $\pm$ 5% 1/4 W	6099-2685	75042	BTS, 6.8 k Ω $\pm$ 5%	
R311	RESISTOR, Composition, 6.8 k Ω $\pm$ 5% 1/4 W	6099-2685	75042	BTS, 6.8 k Ω $\pm$ 5%	
R312	RESISTOR, Composition, 5.1 k Ω $\pm$ 5% 1/4 W	6099-2515	75042	BTS, 5.1 k Ω $\pm$ 5%	5905-279-4623
R313	RESISTOR, Composition, 10 k Ω $\pm$ 5% 1/4 W	6099-3105	75042	BTS, 10 k Ω $\pm$ 5%	
R314	RESISTOR, Composition, 51 k Ω $\pm$ 5% 1/4 W	6099-3515	75042	BTS, 51 k Ω $\pm$ 5%	5905-200-6731
R315	RESISTOR, Composition, 51 k Ω $\pm$ 5% 1/4 W	6099-3515	75042	BTS, 51 k Ω $\pm$ 5%	5905-200-6731
R316	RESISTOR, Composition, 18 k Ω $\pm$ 5% 1/4 W	6099-3185	75042	BTS, 18 k Ω $\pm$ 5%	
R317	RESISTOR, Composition, 1 k Ω $\pm$ 5% 1/4 W	6099-2105	75042	BTS, 1 k Ω $\pm$ 5%	
R318	RESISTOR, Composition, 100 k Ω $\pm$ 5% 1/4 W	6099-4105	75042	BTS, 100 k Ω $\pm$ 5%	
R319	RESISTOR, Composition, 51 k Ω $\pm$ 5% 1/4 W	6099-3515	75042	BTS, 51 k Ω $\pm$ 5%	5905-200-6731
R320	RESISTOR, Composition, 1 k Ω $\pm$ 5% 1/4 W	6099-2105	75042	BTS, 1 k Ω $\pm$ 5%	
R321	RESISTOR, Composition, 20 k Ω $\pm$ 5% 1/4 W	6099-3205	75042	BTS, 20 k Ω $\pm$ 5%	
R322	RESISTOR, Composition, 6.8 k Ω $\pm$ 5% 1/4 W	6099-2685	75042	BTS, 6.8 k Ω $\pm$ 5%	
R323	RESISTOR, Composition, 6.8 k Ω $\pm$ 5% 1/4 W	6099-2685	75042	BTS, 6.8 k Ω $\pm$ 5%	
R324	RESISTOR, Composition, 5.1 k Ω $\pm$ 5% 1/4 W	6099-2515	75042	BTS, 5.1 k Ω $\pm$ 5%	5905-279-4623
R325	RESISTOR, Composition, 10 k Ω $\pm$ 5% 1/4 W	6099-3105	75042	BTS, 10 k Ω $\pm$ 5%	
R326	RESISTOR, Composition, 51 k Ω $\pm$ 5% 1/4 W	6099-3515	75042	BTS, 51 k Ω $\pm$ 5%	5905-200-6731
R327	RESISTOR, Composition, 51 k Ω $\pm$ 5% 1/4 W	6099-3515	75042	BTS, 51 k Ω $\pm$ 5%	5905-200-6731
R328	RESISTOR, Composition, 18 k Ω $\pm$ 5% 1/4 W	6099-3185	75042	BTS, 18 k Ω $\pm$ 5%	
R329	RESISTOR, Composition, 1 k Ω $\pm$ 5% 1/4 W	6099-2105	75042	BTS, 1 k Ω $\pm$ 5%	
R330	RESISTOR, Composition, 100 k Ω $\pm$ 5% 1/4 W	6099-4105	75042	BTS, 100 k Ω $\pm$ 5%	
R331	RESISTOR, Composition, 51 k Ω $\pm$ 5% 1/4 W	6099-3515	75042	BTS, 51 k Ω $\pm$ 5%	
R332	RESISTOR, Composition, 1 k Ω $\pm$ 5% 1/4 W	6099-2105	75042	BTS, 1 k Ω $\pm$ 5%	
R333	RESISTOR, Composition, 20 k Ω $\pm$ 5% 1/4 W	6099-3205	75042	BTS, 20 k Ω $\pm$ 5%	
R334	RESISTOR, Composition, 6.8 k Ω $\pm$ 5% 1/4 W	6099-2685	75042	BTS, 6.8 k Ω $\pm$ 5%	
R335	RESISTOR, Composition, 6.8 k Ω $\pm$ 5% 1/4 W	6099-2685	75042	BTS, 6.8 k Ω $\pm$ 5%	
R336	RESISTOR, Composition, 5.1 k Ω $\pm$ 5% 1/4 W	6099-2515	75042	BTS, 5.1 k Ω $\pm$ 5%	5905-279-4623
R337	RESISTOR, Composition, 10 k Ω $\pm$ 5% 1/4 W	6099-3105	75042	BTS, 10 k Ω $\pm$ 5%	
R338	RESISTOR, Composition, 51 k Ω $\pm$ 5% 1/4 W	6099-3515	75042	BTS, 51 k Ω $\pm$ 5%	5905-200-6731
R339	RESISTOR, Composition, 51 k Ω $\pm$ 5% 1/4 W	6099-3515	75042	BTS, 51 k Ω $\pm$ 5%	5905-200-6731
R340	RESISTOR, Composition, 18 k Ω $\pm$ 5% 1/4 W	6099-3185	75042	BTS, 18 k Ω $\pm$ 5%	
R341	RESISTOR, Composition, 1 k Ω $\pm$ 5% 1/4 W	6099-2105	75042	BTS, 1 k Ω $\pm$ 5%	
R342	RESISTOR, Composition, 100 k Ω $\pm$ 5% 1/4 W	6099-4105	75042	BTS, 100 k Ω $\pm$ 5%	
R343	RESISTOR, Composition, 51 k Ω $\pm$ 5% 1/4 W	6099-3515	75042	BTS, 51 k Ω $\pm$ 5%	
R344	RESISTOR, Composition, 1 k Ω $\pm$ 5% 1/4 W	6099-2105	75042	BTS, 1 k Ω $\pm$ 5%	
R345	RESISTOR, Composition, 20 k Ω $\pm$ 5% 1/4 W	6099-3205	75042	BTS, 20 k Ω $\pm$ 5%	
R346	RESISTOR, Composition, 6.8 k Ω $\pm$ 5% 1/4 W	6099-2685	75042	BTS, 6.8 k Ω $\pm$ 5%	
R347	RESISTOR, Composition, 6.8 k Ω $\pm$ 5% 1/4 W	6099-2685	75042	BTS, 6.8 k Ω $\pm$ 5%	
R348	RESISTOR, Composition, 5.1 k Ω $\pm$ 5% 1/4 W	6099-2515	75042	BTS, 5.1 k Ω $\pm$ 5%	5905-279-4623
Q301	TRANSISTOR, Type 2N3646	8210-1119	24655	8210-1119	
Q302	TRANSISTOR, Type 2N3905	8210-1114	04713	2N3905	
Q303	TRANSISTOR, Type 2N3646	8210-1119	24655	8210-1119	
Q304	TRANSISTOR, Type 2N3905	8210-1114	04713	2N3905	
Q305	TRANSISTOR, Type 2N3646	8210-1119	24655	8210-1119	
Q306	TRANSISTOR, Type 2N3905	8210-1114	04713	2N3905	
Q307	TRANSISTOR, Type 2N3646	8210-1119	24655	8210-1119	
Q308	TRANSISTOR, Type 2N3905	8210-1114	04713	2N3905	

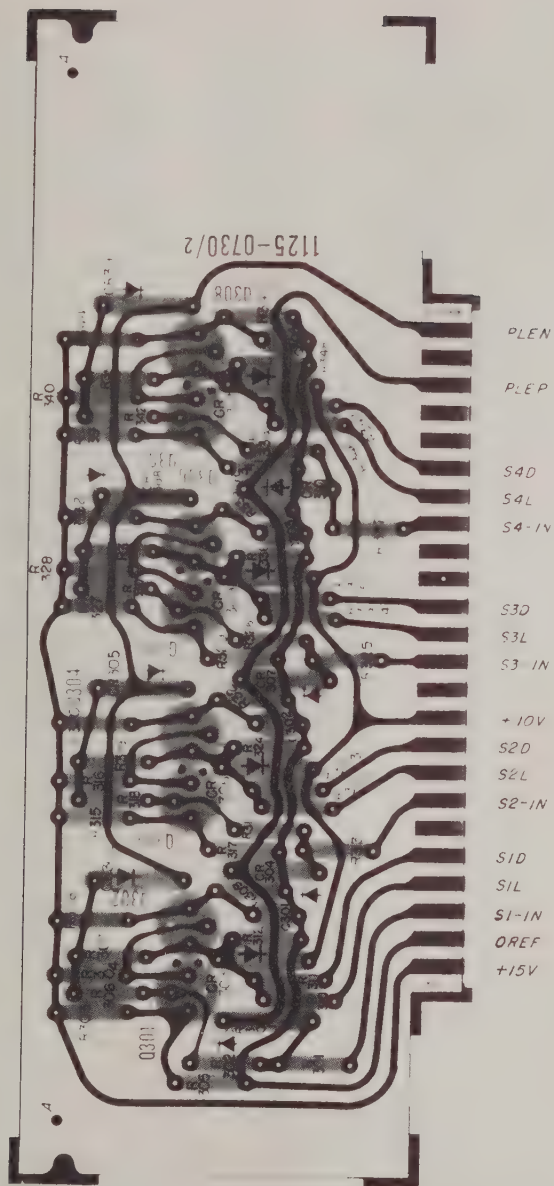
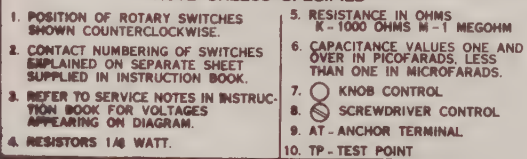
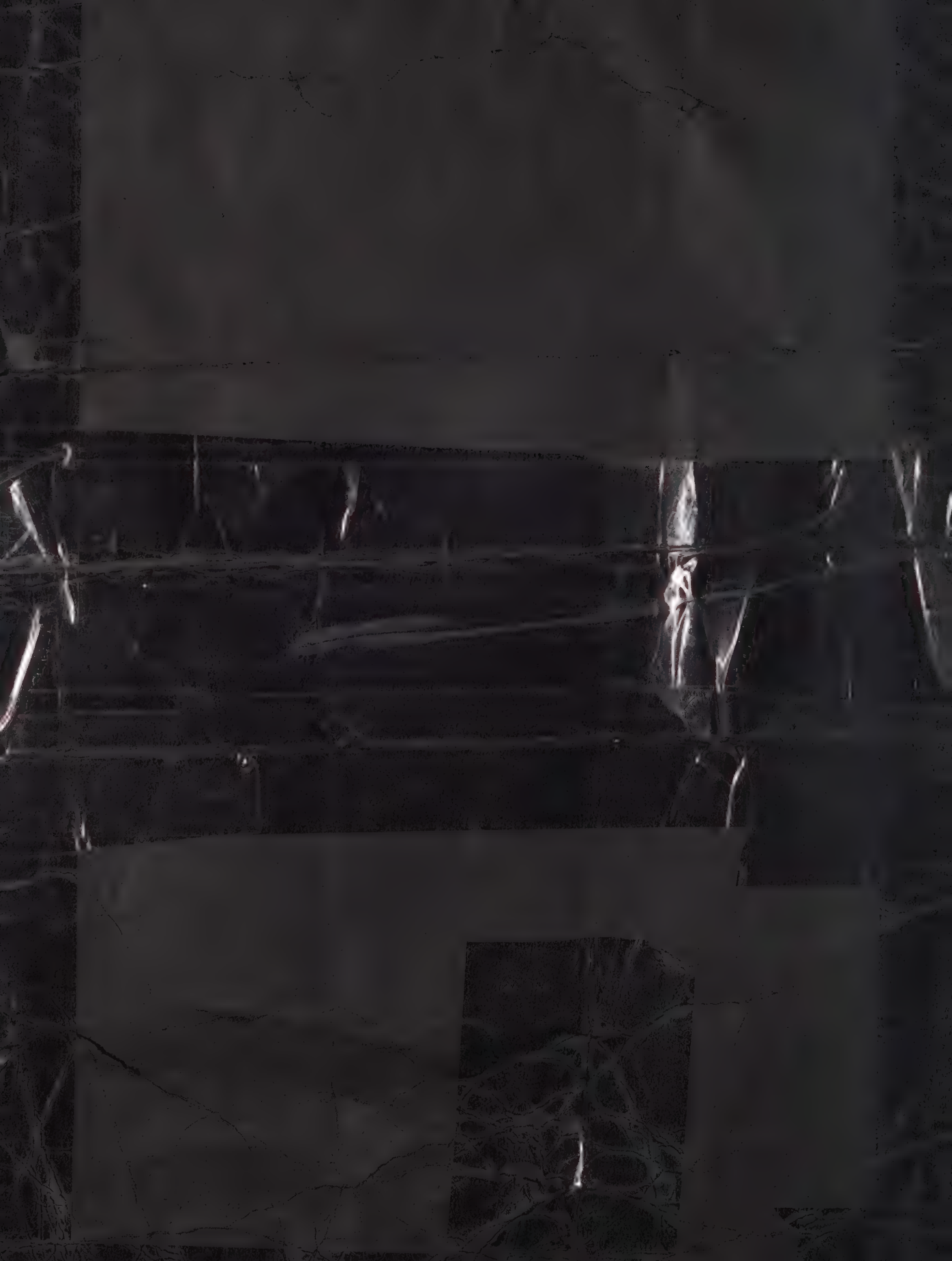


Figure 6-11. Storage circuit etched-board assembly (P/N 1125-4730).

NOTE: The number appearing on the foil side is not the part number.
The dot on the foil at the transistor socket indicates the collector lead.





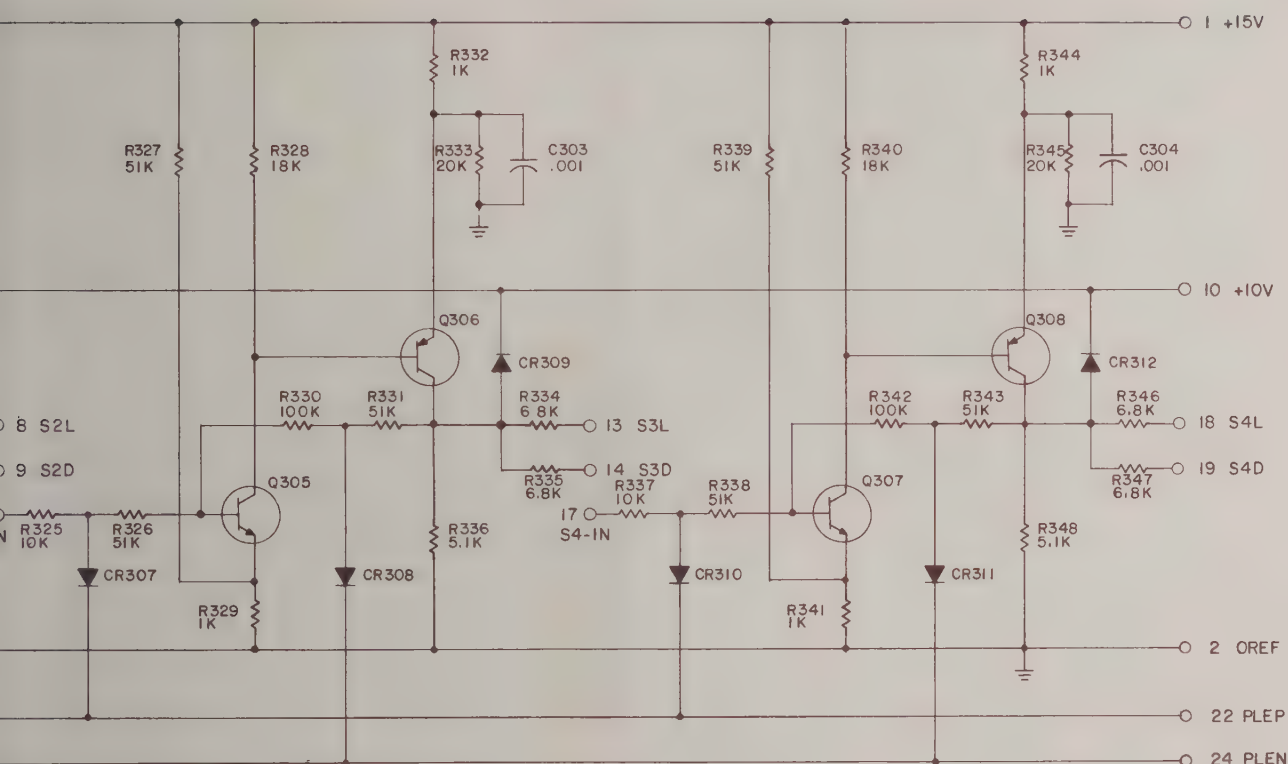
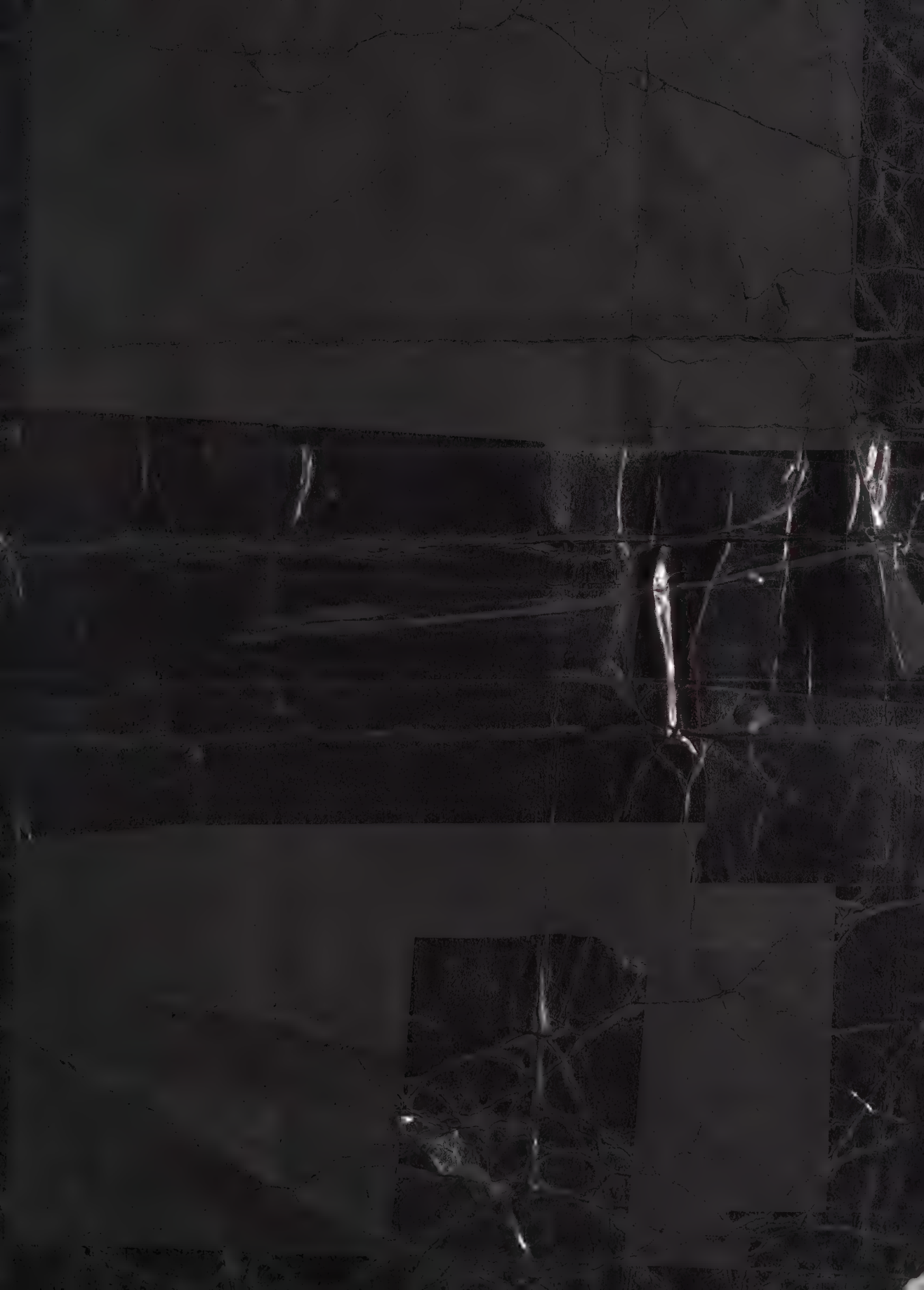
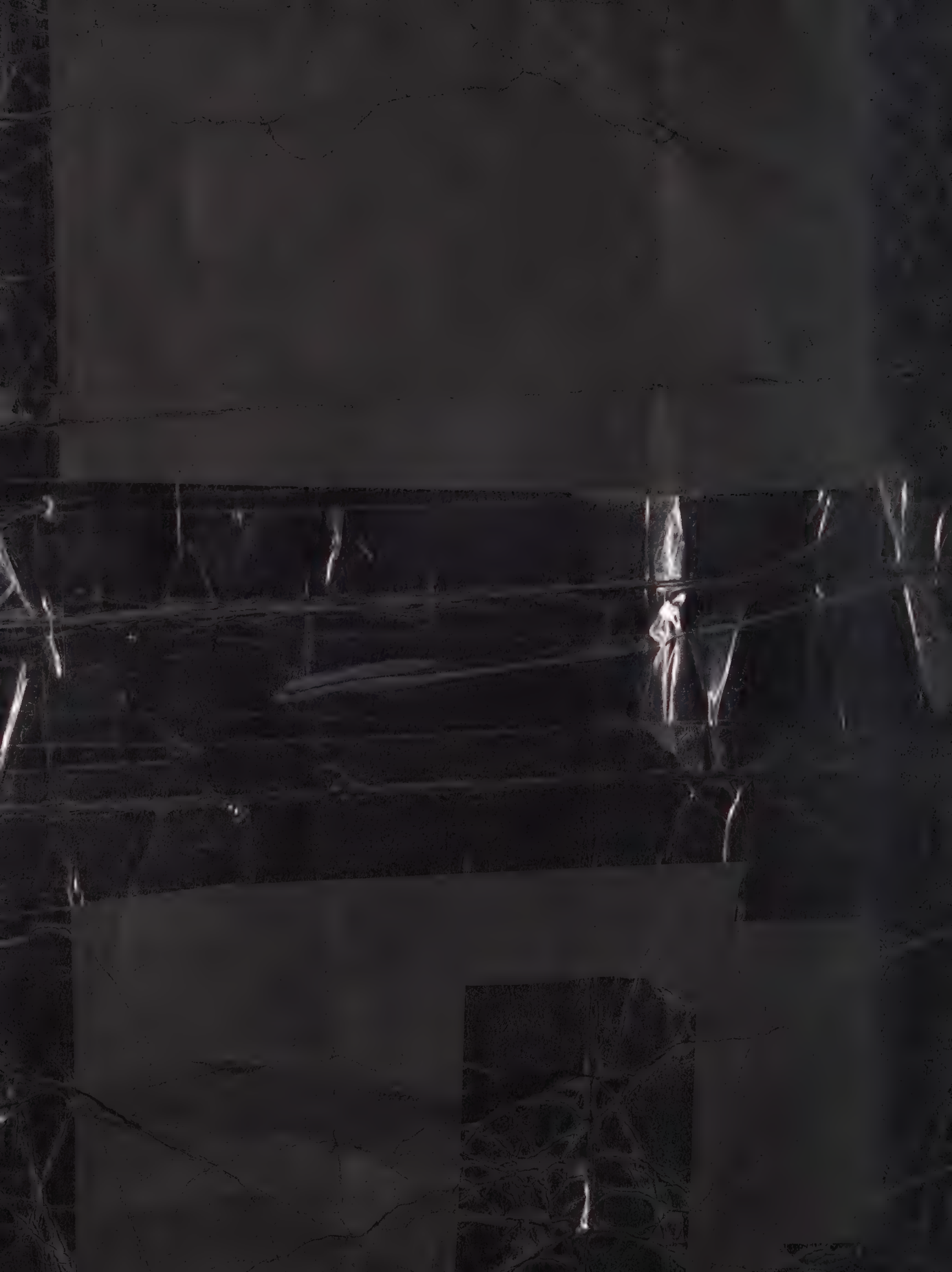


Figure 6-12. Storage circuit schematic diagram.





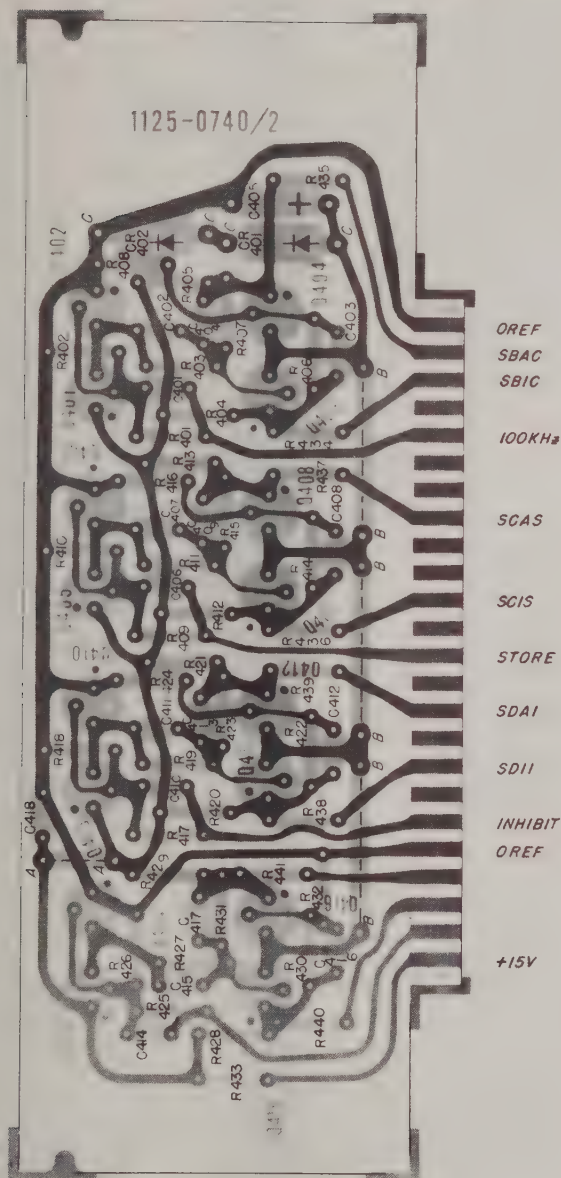
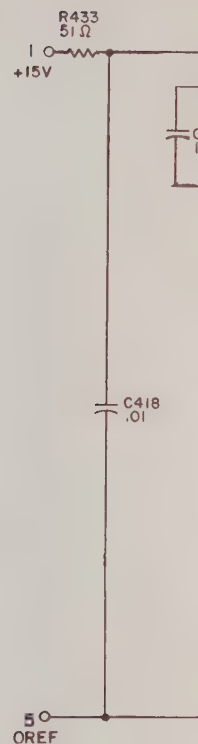


Figure 6-13. Input circuit etched-board assembly (P/N 1125-4740).

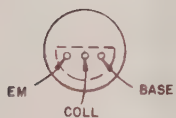
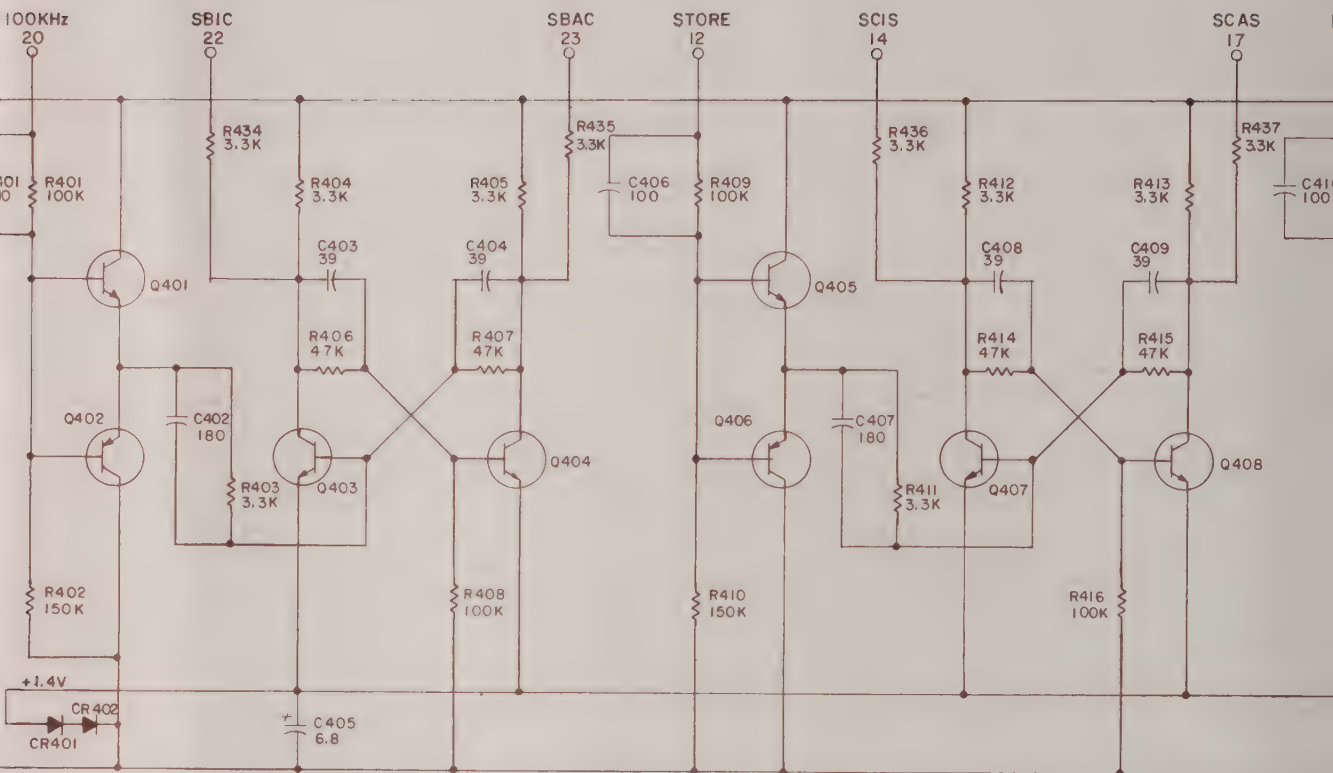
NOTE: The number appearing on the foil side is not the part number. The dot on the foil at the transistor socket indicates the collector lead.



Q403, Q404, Q408, Q411, Q415, Q416

NOTE

1. POSITION OF ROTARY SW/ SHOWN COUNTERCLOCKW/
2. CONTACT NUMBERING OF : EXPLAINED ON SEPARATE SUPPLIED IN INSTRUCTION
3. REFER TO SERVICE NOTES TION BOOK FOR VOLTAGE APPEARING ON DIAGRAM.
4. RESISTORS 1/4 WATT.

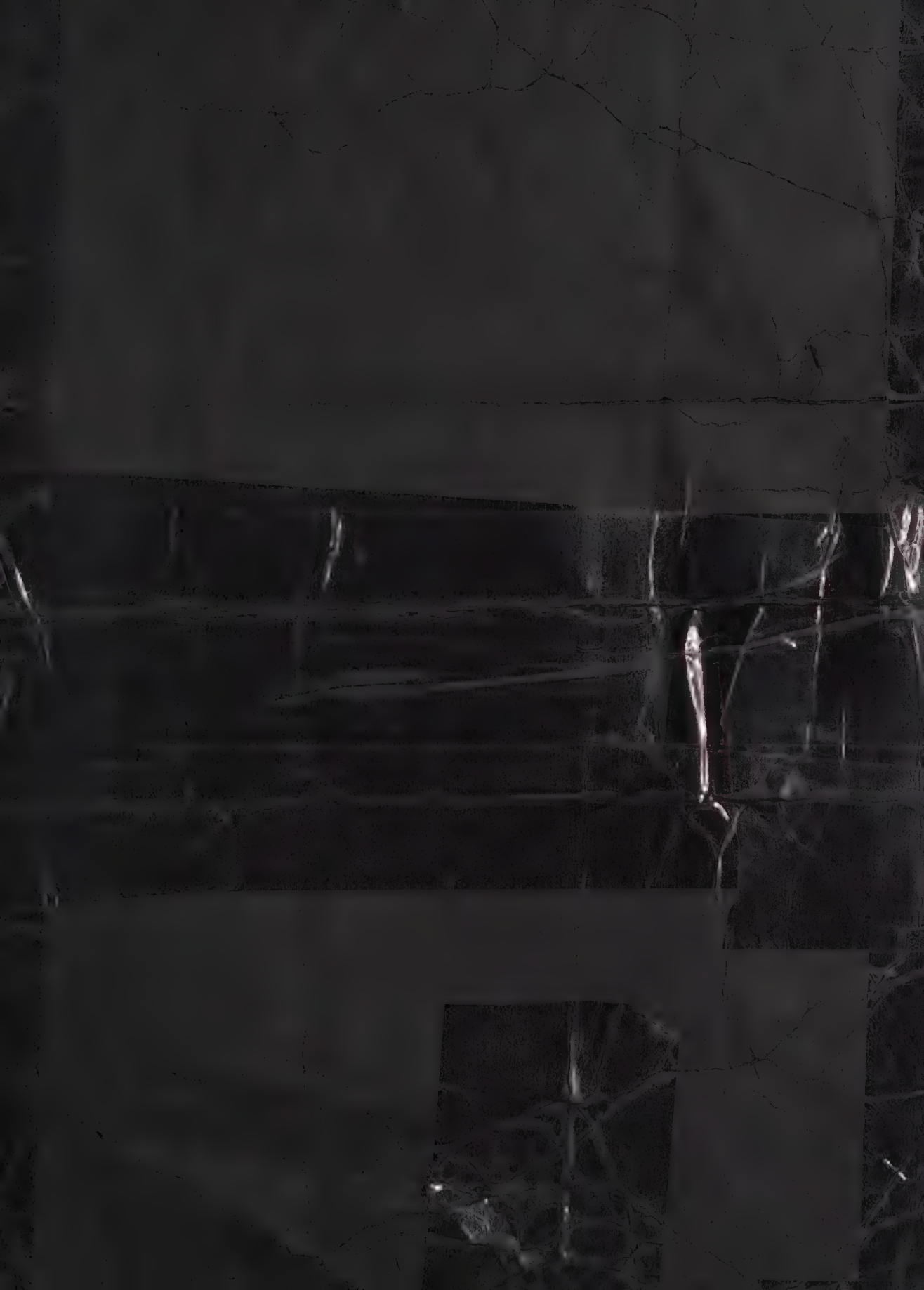


Q401, Q405, Q409,
Q413

Q402, Q406, Q410,
Q414

BOTTOM VIEW

UNLESS SPECIFIED	
5.	RESISTANCE IN OHMS K - 1000 OHMS M - 1 MEGOHM
6.	CAPACITANCE VALUES ONE AND OVER IN PICO FARADS, LESS THAN ONE IN MICRO FARADS.
7.	⊖ KNOB CONTROL
8.	⊖ SCREWDRIVER CONTROL
9.	AT - ANCHOR TERMINAL
10.	TP - TEST POINT



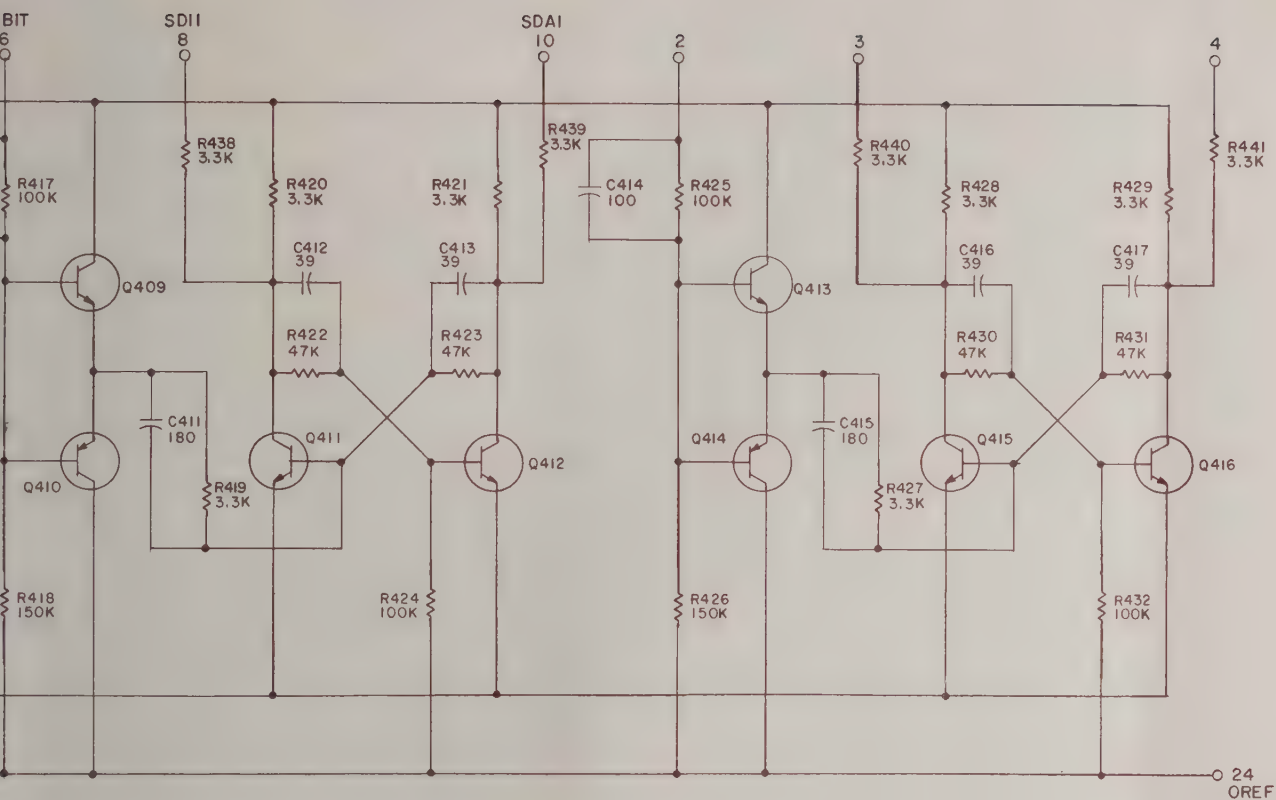
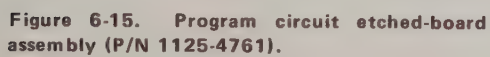


Figure 6-14. Input circuit schematic diagram.

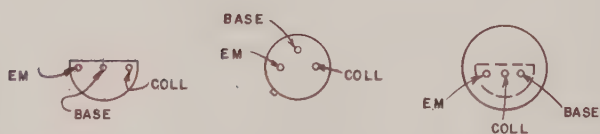
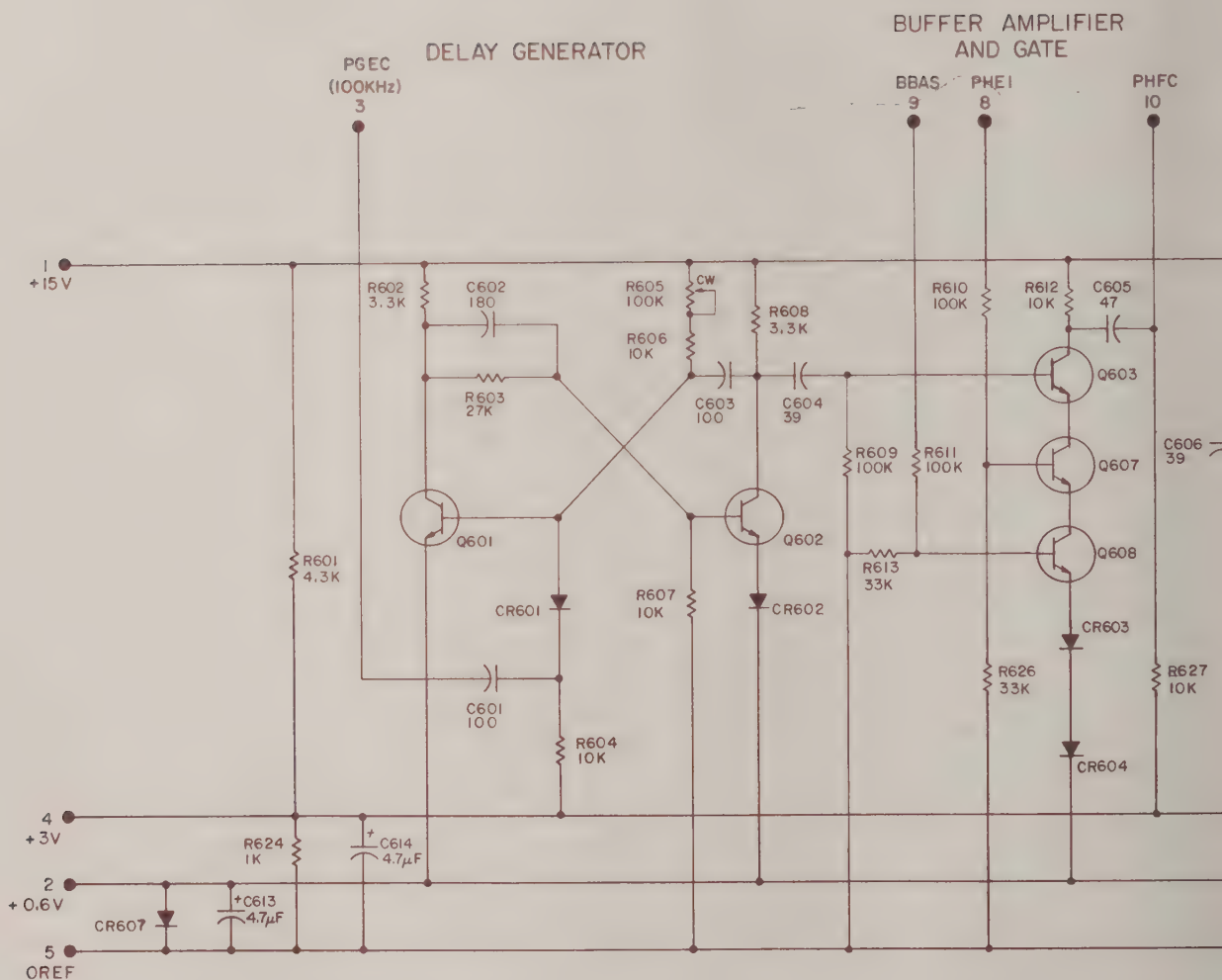
Ref. No.	Description	Part No.	Fed. Mfg. Code	Mfg. Part No.	Fed. Stock No.
C601	CAPACITOR, Ceramic, 100 pF $\pm$ 10% 500 V	4404-1108	72982	831, 100 pF $\pm$ 10%	
C602	CAPACITOR, Ceramic, 180 pF $\pm$ 10% 500 V	4404-1188	72982	831, 180 pF $\pm$ 10%	
C603	CAPACITOR, Ceramic, 100 pF $\pm$ 5% 500 V	4404-1105	72982	831, 100 pF $\pm$ 5%	
C604	CAPACITOR, Ceramic, 39 pF $\pm$ 10% 500 V	4404-0398	72982	831, 39 pF $\pm$ 10%	
C605	CAPACITOR, Ceramic, 47 pF $\pm$ 10% 500 V	4404-0478	72982	831, 47 pF $\pm$ 10%	
C606	CAPACITOR, Ceramic, 39 pF $\pm$ 10% 500 V	4404-0398	72982	831, 39 pF $\pm$ 10%	
C607	CAPACITOR, Ceramic, 47 pF $\pm$ 10% 500 V	4404-0478	72982	831, 47 pF $\pm$ 10%	
C608	CAPACITOR, Ceramic, 47 pF $\pm$ 10% 500 V	4404-0478	72982	831, 47 pF $\pm$ 10%	
C609	CAPACITOR, Ceramic, 39 pF $\pm$ 10% 500 V	4404-0398	72982	831, 39 pF $\pm$ 10%	
C610	CAPACITOR, Ceramic, 220 pF $\pm$ 10% 500 V	4404-1228	72982	831, 220 pF $\pm$ 10%	
C611	CAPACITOR, Electrolytic, 22 μ F $\pm$ 20% 15 V	4450-5300	56289	150D226X0015B2	5910-752-42
C612	CAPACITOR, Ceramic, 100 pF $\pm$ 10% 500 V	4404-1108	72982	831, 100 pF $\pm$ 10%	
C613	CAPACITOR, Electrolytic, 4.7 μ F $\pm$ 20% 10 V	4450-4700	56289	150D475X0015B2	5910-813-81
C614	CAPACITOR, Electrolytic, 4.7 μ F $\pm$ 20% 10 V	4450-4700	56289	150D475X0015B2	5910-813-81
CR601	DIODE, Type 1N4009	6082-1012	24446	1N4009	
CR602	DIODE, Type 1N4009	6082-1012	24446	1N4009	
CR603	DIODE, Type 1N645	6082-1016	24446	1N645	5961-944-82
CR604	DIODE, Type 1N645	6082-1016	24446	1N645	5961-944-82
CR605	DIODE, Type 1N758A	6083-1012	24446	1N758A	
CR606	DIODE, Type 1N4009	6082-1012	24446	1N4009	
CR607	DIODE, Type 1N645	6082-1016	24446	1N645	5961-944-82
R601	RESISTOR, Composition, 4.3 k Ω $\pm$ 5% 1/4 W	6099-2435	75042	BTS, 4.3 k Ω $\pm$ 5%	
R602	RESISTOR, Composition, 3.3 k Ω $\pm$ 5% 1/4 W	6099-2335	75042	BTS, 3.3 k Ω $\pm$ 5%	
R603	RESISTOR, Composition, 27 k Ω $\pm$ 5% 1/4 W	6099-3275	75042	BTS, 27 k Ω $\pm$ 5%	
R604	RESISTOR, Composition, 10 k Ω $\pm$ 5% 1/4 W	6099-3105	75042	BTS, 10 k Ω $\pm$ 5%	
R605	RESISTOR, Composition, 100 k Ω $\pm$ 10%	6046-4108	75042	BTS, 100 k Ω $\pm$ 10%	
R606	RESISTOR, Composition, 10 k Ω $\pm$ 5% 1/4 W	6099-3105	75042	BTS, 10 k Ω $\pm$ 5%	
R607	RESISTOR, Composition, 10 k Ω $\pm$ 5% 1/4 W	6099-3105	75042	BTS, 10 k Ω $\pm$ 5%	
R608	RESISTOR, Composition, 3.3 k Ω $\pm$ 5% 1/4 W	6099-2335	75042	BTS, 3.3 k Ω $\pm$ 5%	
R609	RESISTOR, Composition, 100 k Ω $\pm$ 5% 1/4 W	6099-4105	75042	BTS, 100 k Ω $\pm$ 5%	
R610	RESISTOR, Composition, 100 k Ω $\pm$ 5% 1/4 W	6099-4105	75042	BTS, 100 k Ω $\pm$ 5%	
R611	RESISTOR, Composition, 100 k Ω $\pm$ 5% 1/4 W	6099-4105	75042	BTS, 100 k Ω $\pm$ 5%	
R612	RESISTOR, Composition, 10 k Ω $\pm$ 5% 1/4 W	6099-3105	75042	BTS, 10 k Ω $\pm$ 5%	
R613	RESISTOR, Composition, 33 k Ω $\pm$ 5% 1/4 W	6099-3335	75042	BTS, 33 k Ω $\pm$ 5%	
R614	RESISTOR, Composition, 51 k Ω $\pm$ 5% 1/4 W	6099-3515	75042	BTS, 51 k Ω $\pm$ 5%	5905-200-67
R615	RESISTOR, Composition, 3.3 k Ω $\pm$ 5% 1/4 W	6099-2335	75042	BTS, 3.3 k Ω $\pm$ 5%	
R616	RESISTOR, Composition, 10 k Ω $\pm$ 5% 1/4 W	6099-3105	75042	BTS, 10 k Ω $\pm$ 5%	
R617	RESISTOR, Composition, 10 k Ω $\pm$ 5% 1/4 W	6099-3105	75042	BTS, 10 k Ω $\pm$ 5%	
R618	RESISTOR, Composition, 100 k Ω $\pm$ 5% 1/4 W	6099-4105	75042	BTS, 100 k Ω $\pm$ 5%	
R619	RESISTOR, Composition, 510 Ω $\pm$ 5% 1/2 W	6100-1515	01121	RC20GF11J	5905-279-35
R620	RESISTOR, Composition, 10 k Ω $\pm$ 5% 1/4 W	6099-3105	75042	BTS, 10 k Ω $\pm$ 5%	
R621	RESISTOR, Composition, 10 k Ω $\pm$ 10%	6057-3109	07999	992P, 10 k Ω $\pm$ 10%	
R622	RESISTOR, Composition, 180 Ω $\pm$ 5% 1/4 W	6099-1185	75042	BTS, 180 Ω $\pm$ 5%	5905-279-547
R623	RESISTOR, Composition, 180 Ω $\pm$ 5% 1/4 W	6099-1185	75042	BTS, 180 Ω $\pm$ 5%	5905-279-547
R624	RESISTOR, Composition, 1 k Ω $\pm$ 5% 1/4 W	6099-2105	75042	BTS, 1 k Ω $\pm$ 5%	
R625	RESISTOR, Composition, 4.7 k Ω $\pm$ 5% 1/4 W	6099-2475	75042	BTS, 4.7 k Ω $\pm$ 5%	
R626	RESISTOR, Composition, 33 k Ω $\pm$ 5% 1/4 W	6099-3335	75042	BTS, 33 k Ω $\pm$ 5%	
R627	RESISTOR, Composition, 10 k Ω $\pm$ 5% 1/4 W	6099-3105	75042	BTS, 10 k Ω $\pm$ 5%	
T601	TRANSFORMER	1125-2120	24655	1125-2120	
Q601	TRANSISTOR, Type 2N2713	8210-1086	03508	2N2713	
Q602	TRANSISTOR, Type 2N2713	8210-1086	03508	2N2713	
Q603	TRANSISTOR, Type 2N4123	8210-1123	93916	2N4123	
Q604	TRANSISTOR, Type 2N708	8210-3089	24454	2N708	
Q605	TRANSISTOR, Type 2N2713	8210-1086	03508	2N2713	
Q606	TRANSISTOR, Type 2N2218	8210-1028	81349	2N2218	5960-059-446
Q607	TRANSISTOR, Type 2N4123	8210-1123	93916	2N4123	
Q608	TRANSISTOR, Type 2N4123	8210-1123	93916	2N4136	



NOTE: The number appearing on the foil side is not the part number.
The dot on the foil at the transistor socket indicates the collector lead.

NOTE UNLESS

1. POSITION OF ROTARY SWITCHES SHOWN COUNTERCLOCKWISE.
2. CONTACT NUMBERING OF SWITCHES EXPLAINED ON SEPARATE SHEET SUPPLIED IN INSTRUCTION BOOK.
3. REFER TO SERVICE NOTES IN INSTRUCTION BOOK FOR VOLTAGES APPEARING ON DIAGRAM.
4. RESISTORS 1/4 WATT.



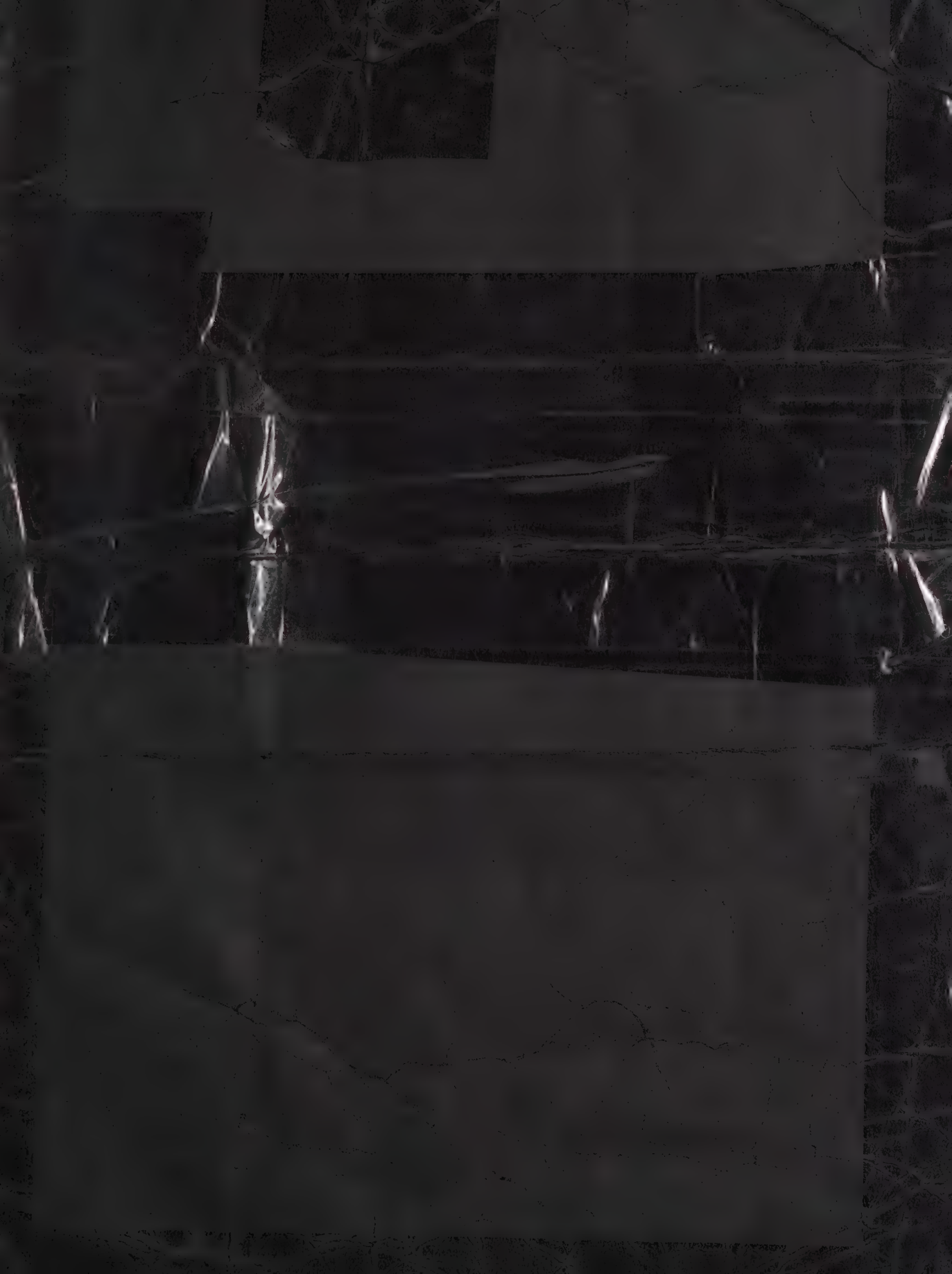
Q603, Q607, Q608

Q604, Q606

Q601, Q602, Q605

TRANSISTORS

BOTTOM VIEW



- SPECIFIED**
5. RESISTANCE IN OHMS
K-1000 OHMS M-1 MEGOHM
 6. CAPACITANCE VALUES ONE AND OVER IN PICOFARADS, LESS THAN ONE IN MICROFARADS.
 7.  KNOB CONTROL
 8.  SCREWDRIVER CONTROL
 9. AT-ANCHOR TERMINAL
 10. TP-TEST POINT

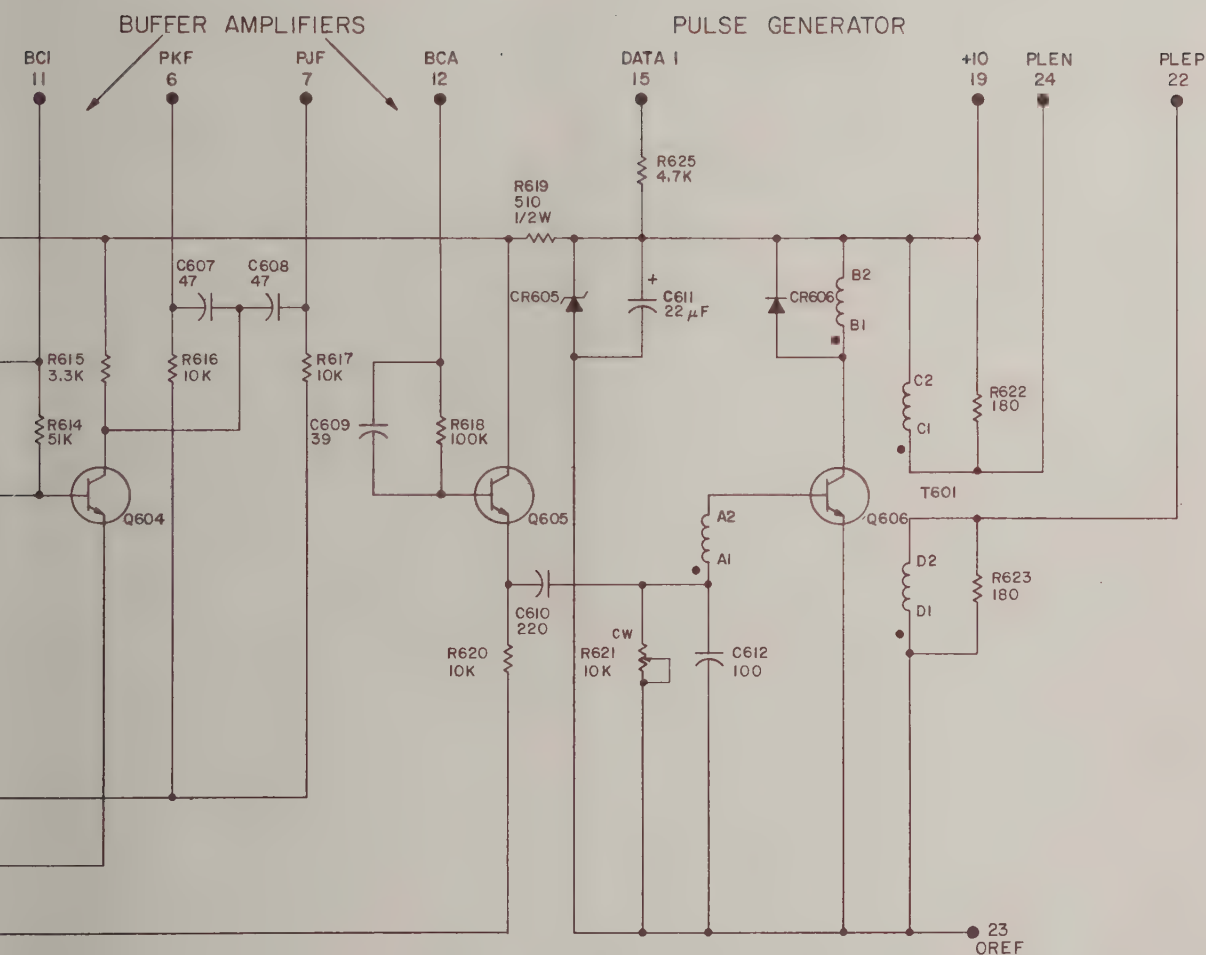


Figure 6-16. Program circuit schematic diagram.

Ref. No.	Description	Part No.	Fed. Mfg. Code	Mfg. Part No.	Fed. Stock No.
C102	CAPACITOR, Ceramic, 47 pF $\pm 10\%$	4404-0478	72982	831, 47 pF $\pm 10\%$	
C103	CAPACITOR, Ceramic, 47 pF $\pm 10\%$	4404-0478	72982	831, 47 pF $\pm 10\%$	
C105	CAPACITOR, Ceramic, 47 pF $\pm 10\%$	4404-0478	72982	831, 47 pF $\pm 10\%$	
C106	CAPACITOR, Ceramic, 47 pF $\pm 10\%$	4404-0478	72982	831, 47 pF $\pm 10\%$	
C108	CAPACITOR, Ceramic, 47 pF $\pm 10\%$	4404-0478	72982	831, 47 pF $\pm 10\%$	
C109	CAPACITOR, Ceramic, 47 pF $\pm 10\%$	4404-0478	72982	831, 47 pF $\pm 10\%$	
C111	CAPACITOR, Ceramic, 47 pF $\pm 10\%$	4404-0478	72982	831, 47 pF $\pm 10\%$	
C112	CAPACITOR, Ceramic, 47 pF $\pm 10\%$	4404-0478	72982	831, 47 pF $\pm 10\%$	
C114	CAPACITOR, Ceramic, 0.01 μ F +80 -20%	4401-3100	80131	CC61, 0.01 μ F +80 -20%	5910-974-5697
CR111	DIODE, Type 1N4009	6082-1012	24446	1N4009	
CR112	DIODE, Type 1N4009	6082-1012	24446	1N4009	
CR113	DIODE, Type 1N4009	6082-1012	24446	1N4009	
CR114	DIODE, Type 1N4009	6082-1012	24446	1N4009	
CR115	DIODE, Type 1N4009	6082-1012	24446	1N4009	
CR116	DIODE, Type 1N4009	6082-1012	24446	1N4009	
CR117	DIODE, Type 1N4009	6082-1012	24446	1N4009	
CR118	DIODE, Type 1N4009	6082-1012	24446	1N4009	
R102	RESISTOR, Composition, 10 k Ω $\pm 10\%$	6099-3109	75042	BTS, 10 k Ω $\pm 10\%$	
R103	RESISTOR, Composition, 10 k Ω $\pm 10\%$	6099-3109	75042	BTS, 10 k Ω $\pm 10\%$	
R104	RESISTOR, Composition, 3.3 k Ω $\pm 10\%$	6099-2339	75042	BTS, 3.3 k Ω $\pm 10\%$	
R105	RESISTOR, Composition, 3.3 k Ω $\pm 10\%$	6099-2339	75042	BTS, 3.3 k Ω $\pm 10\%$	
R106	RESISTOR, Composition, 3.3 k Ω $\pm 10\%$	6099-2339	75042	BTS, 3.3 k Ω $\pm 10\%$	
R107	RESISTOR, Composition, 3.3 k Ω $\pm 10\%$	6099-2339	75042	BTS, 3.3 k Ω $\pm 10\%$	
R108	RESISTOR, Composition, 27 k Ω $\pm 10\%$	6099-3279	75042	BTS, 27 k Ω $\pm 10\%$	
R109	RESISTOR, Composition, 27 k Ω $\pm 10\%$	6099-3279	75042	BTS, 27 k Ω $\pm 10\%$	
R111	RESISTOR, Composition, 10 k Ω $\pm 10\%$	6099-3109	75042	BTS, 10 k Ω $\pm 10\%$	
R112	RESISTOR, Composition, 10 k Ω $\pm 10\%$	6099-3109	75042	BTS, 10 k Ω $\pm 10\%$	
R113	RESISTOR, Composition, 3.3 k Ω $\pm 10\%$	6099-2339	75042	BTS, 3.3 k Ω $\pm 10\%$	
R114	RESISTOR, Composition, 3.3 k Ω $\pm 10\%$	6099-2339	75042	BTS, 3.3 k Ω $\pm 10\%$	
R115	RESISTOR, Composition, 3.3 k Ω $\pm 10\%$	6099-2339	75042	BTS, 3.3 k Ω $\pm 10\%$	
R116	RESISTOR, Composition, 3.3 k Ω $\pm 10\%$	6099-2339	75042	BTS, 3.3 k Ω $\pm 10\%$	
R117	RESISTOR, Composition, 27 k Ω $\pm 10\%$	6099-3279	75042	BTS, 27 k Ω $\pm 10\%$	
R118	RESISTOR, Composition, 27 k Ω $\pm 10\%$	6099-3279	75042	BTS, 27 k Ω $\pm 10\%$	
R121	RESISTOR, Composition, 10 k Ω $\pm 10\%$	6099-3109	75042	BTS, 10 k Ω $\pm 10\%$	
R122	RESISTOR, Composition, 10 k Ω $\pm 10\%$	6099-3109	75042	BTS, 10 k Ω $\pm 10\%$	
R123	RESISTOR, Composition, 3.3 k Ω $\pm 10\%$	6099-2339	75042	BTS, 3.3 k Ω $\pm 10\%$	
R124	RESISTOR, Composition, 3.3 k Ω $\pm 10\%$	6099-2339	75042	BTS, 3.3 k Ω $\pm 10\%$	
R125	RESISTOR, Composition, 3.3 k Ω $\pm 10\%$	6099-2339	75042	BTS, 3.3 k Ω $\pm 10\%$	
R126	RESISTOR, Composition, 3.3 k Ω $\pm 10\%$	6099-2339	75042	BTS, 3.3 k Ω $\pm 10\%$	
R127	RESISTOR, Composition, 27 k Ω $\pm 10\%$	6099-3279	75042	BTS, 27 k Ω $\pm 10\%$	
R128	RESISTOR, Composition, 27 k Ω $\pm 10\%$	6099-3279	75042	BTS, 27 k Ω $\pm 10\%$	
R131	RESISTOR, Composition, 10 k Ω $\pm 10\%$	6099-3109	75042	BTS, 10 k Ω $\pm 10\%$	
R132	RESISTOR, Composition, 10 k Ω $\pm 10\%$	6099-3109	75042	BTS, 10 k Ω $\pm 10\%$	
R133	RESISTOR, Composition, 3.3 k Ω $\pm 10\%$	6099-2339	75042	BTS, 3.3 k Ω $\pm 10\%$	
R134	RESISTOR, Composition, 3.3 k Ω $\pm 10\%$	6099-2339	75042	BTS, 3.3 k Ω $\pm 10\%$	
R135	RESISTOR, Composition, 3.3 k Ω $\pm 10\%$	6099-2339	75042	BTS, 3.3 k Ω $\pm 10\%$	
R136	RESISTOR, Composition, 3.3 k Ω $\pm 10\%$	6099-2339	75042	BTS, 3.3 k Ω $\pm 10\%$	
R137	RESISTOR, Composition, 27 k Ω $\pm 10\%$	6099-3279	75042	BTS, 27 k Ω $\pm 10\%$	
R138	RESISTOR, Composition, 27 k Ω $\pm 10\%$	6099-3279	75042	BTS, 27 k Ω $\pm 10\%$	
Q101	TRANSISTOR, Type 2N3646	8210-1119	07263	2N3646	
Q102	TRANSISTOR, Type 2N3646	8210-1119	07263	2N3646	
Q103	TRANSISTOR, Type 2N3646	8210-1119	07263	2N3646	
Q104	TRANSISTOR, Type 2N3646	8210-1119	07263	2N3646	
Q105	TRANSISTOR, Type 2N3646	8210-1119	07263	2N3646	
Q106	TRANSISTOR, Type 2N3646	8210-1119	07263	2N3646	
Q107	TRANSISTOR, Type 2N3646	8210-1119	07263	2N3646	
Q108	TRANSISTOR, Type 2N3646	8210-1119	07263	2N3646	

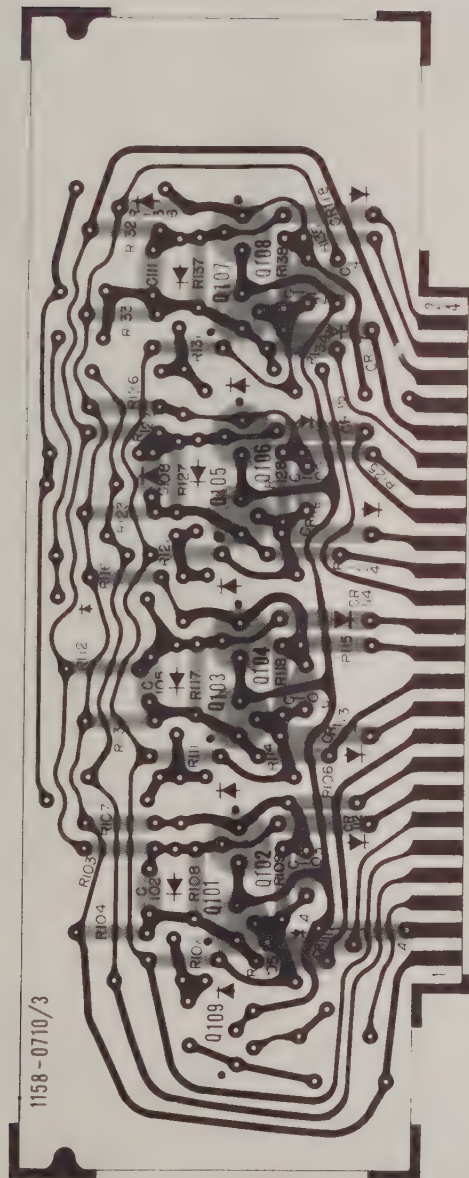
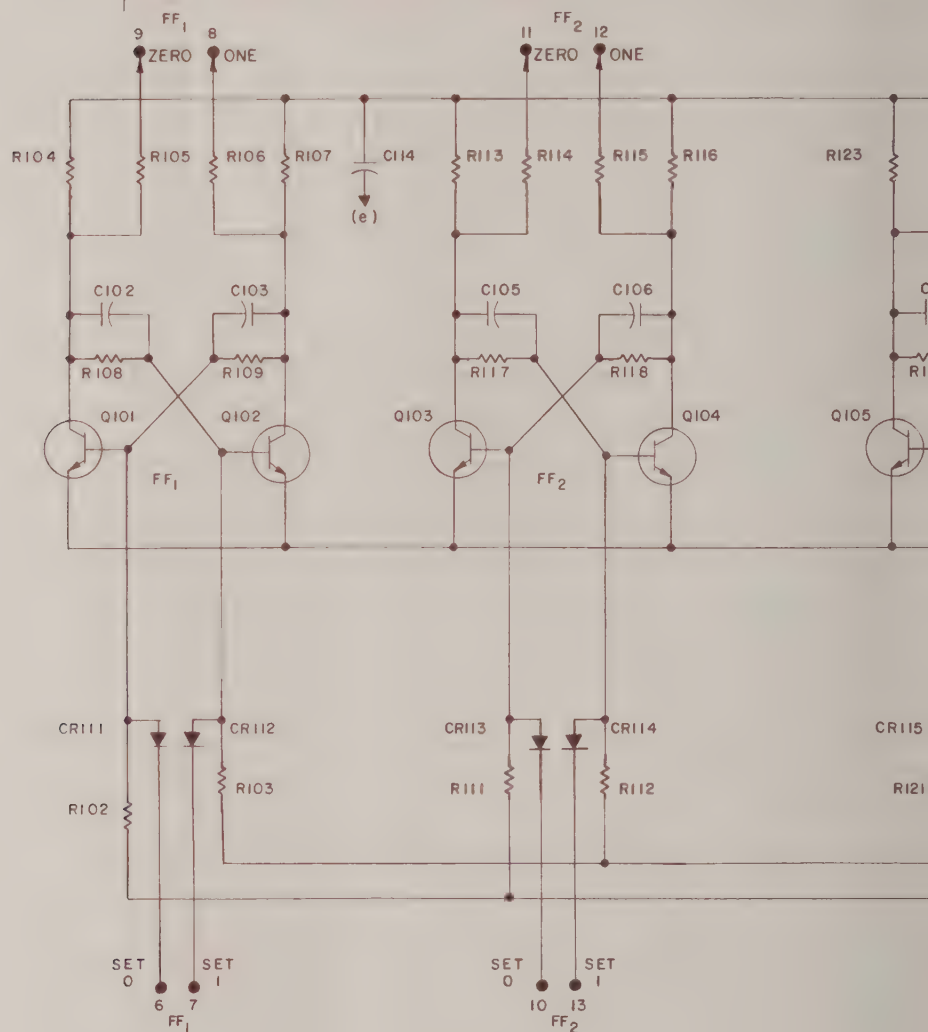


Figure 6-17. Flip-flop circuit etched-board assembly (P/N 1158-4716).

NOTE: The number appearing on the foil side is not the part number. The dot on the foil at the transistor socket indicates the collector lead.



1158-4716
BOTTOM VIEW
Q101 THRU Q108

NOTE UNLESS SPECIFIED

1. POSITION OF ROTARY SWITCHES SHOWN COUNTERCLOCKWISE.
2. CONTACT NUMBERING OF SWITCHES EXPLAINED ON SEPARATE SHEET SUPPLIED IN INSTRUCTION BOOK.
3. REFER TO SERVICE NOTES IN INSTRUCTION BOOK FOR VOLTAGES APPEARING ON DIAGRAM.
4. RESISTORS 1/4 WATT.
5. RESISTANCE IN OHMS
K-1000 OHMS M-1 MEGOHM
6. CAPACITANCE VALUES ONE AND OVER IN PICOFARADS, LESS THAN ONE IN MICROFARADS.
7. ○ KNOB CONTROL
8. ⊗ SCREWDRIVER CONTROL
9. AT-ANCHOR TERMINAL
10. TP-TEST POINT

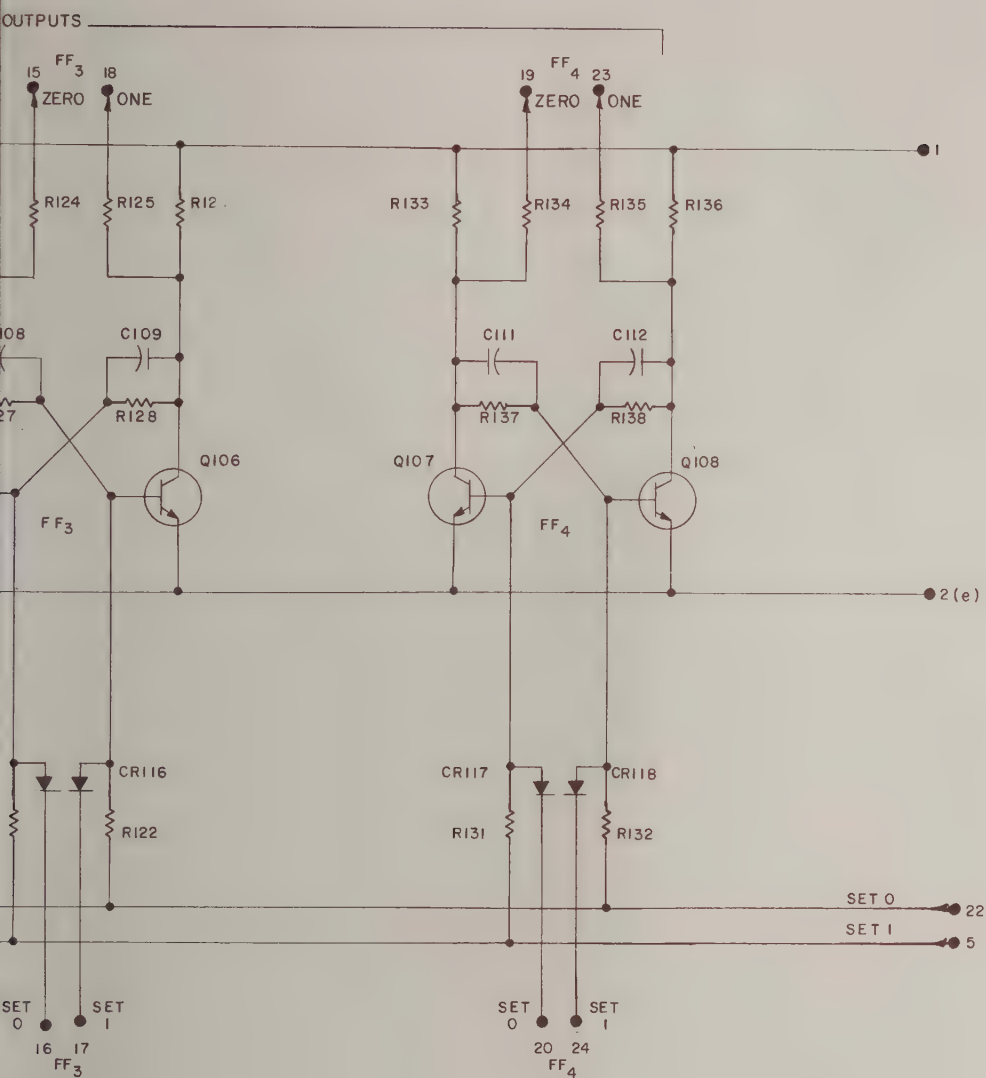
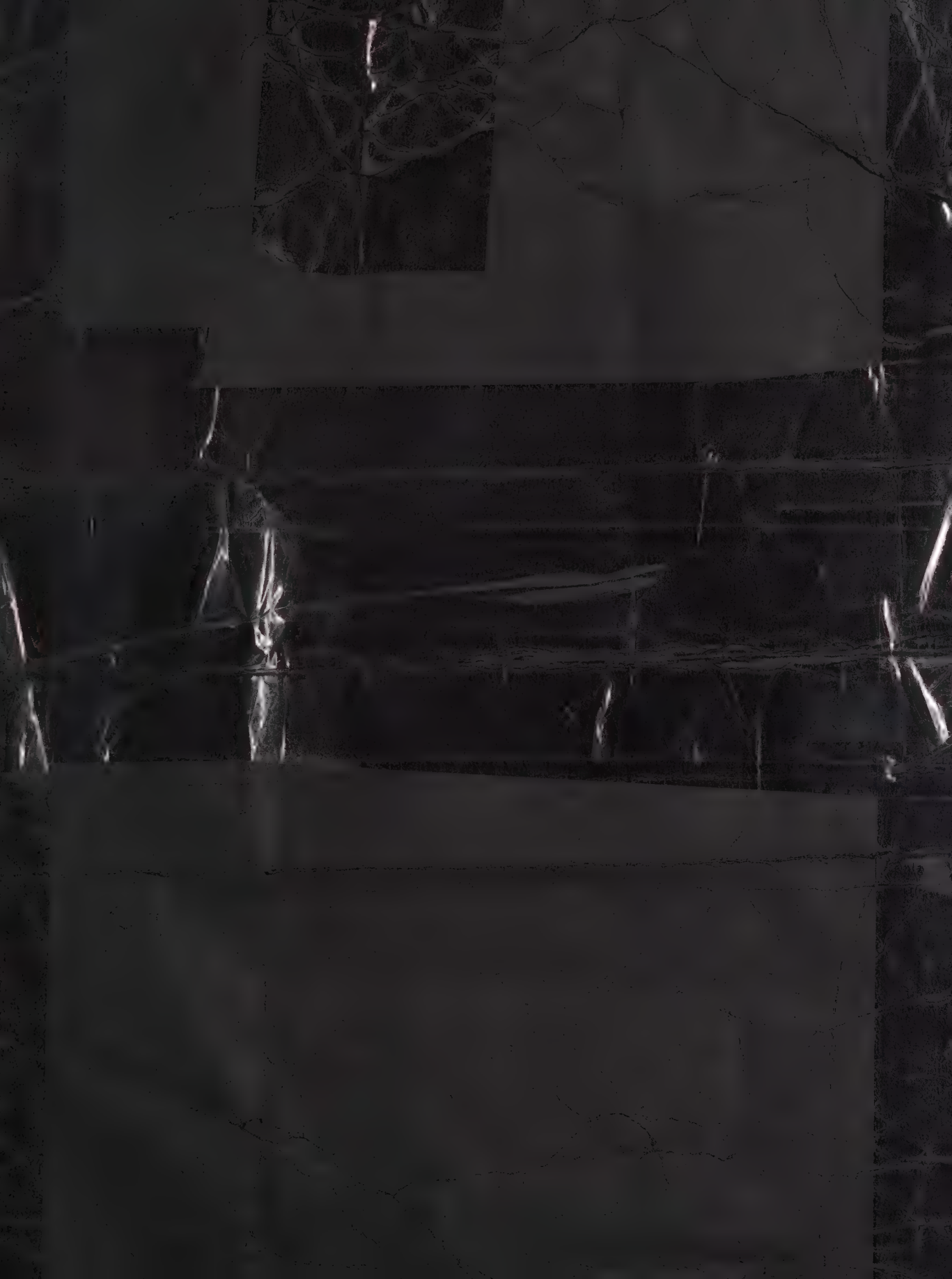


Figure 6-18. Flip-flop circuit schematic diagram.



Ref. No.	Description	Part No.	Fed. Mfg. Code	Mfg. Part No.	Fed. Stock No.
R501	RESISTOR, Composition, $22\Omega \pm 5\%$ 1/2 W	6100-0225	01121	RC20220J	5905-279-3519
R502	RESISTOR, Wirewound, $500\Omega \pm 10\%$	6059-1059	80294	3067P-1-501, $500\Omega \pm 10\%$	
R503	RESISTOR, Composition, $330\Omega \pm 5\%$ 1 W	6110-1335	01121	RC32GF331J	5905-279-2645
R504	RESISTOR, Composition, $750\Omega \pm 5\%$ 1/2 W	6100-1755	01121	RC20GF751J	5905-195-9481
R505	RESISTOR, Composition, $330\Omega \pm 5\%$ 1/2 W	6100-1335	01121	RC20GF331J	5905-192-3971
R506	RESISTOR, Composition, $39\Omega \pm 5\%$ 1/2 W	6100-0395	01121	RC20GF390J	5905-195-5546
R507	RESISTOR, Composition, $240\Omega \pm 5\%$ 1/2 W	6100-1245	01121	RC20GF241J	5905-279-2593
R508	RESISTOR, Composition, $100K\Omega \pm 10\%$ 1/4 W	6099-4109	75042	BTS, $100K\Omega \pm 10\%$	
Q501	TRANSISTOR, Type 2N3638	8210-1096	07263	2N3638	
Q502	TRANSISTOR, Type 2N3414	8210-1047	24446	2N3414	5961-989-2749
Q503	TRANSISTOR, Type 2N3414	8210-1047	24446	2N3414	5961-989-2749
CR501	DIODE, Type 1N4140	6081-1014	13327	1N4140	
CR502	DIODE, Type 1N4140	6081-1014	13327	1N4140	
CR503	DIODE, Type 1N4140	6081-1014	13327	1N4140	
CR504	DIODE, Type 1N4140	6081-1014	13327	1N4140	
CR505	DIODE, Type 1N4009	6082-1012	2446	1N4009	
CR506	DIODE, Type 1N959B	6083-1010	72699	1N959B	

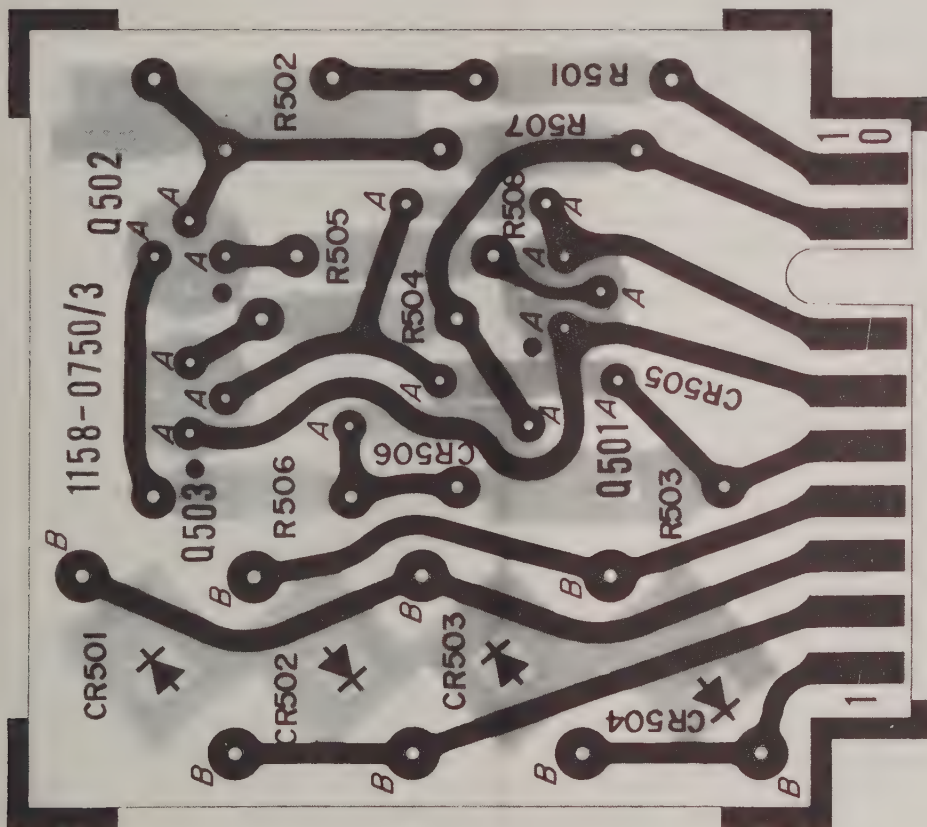


Figure 6-19. Dc power supply regulator circuit etched-board assembly (P/N 1158-4751).

NOTE: The number appearing on the foil side is not the part number. The dot on the foil at the transistor socket indicates the collector lead.

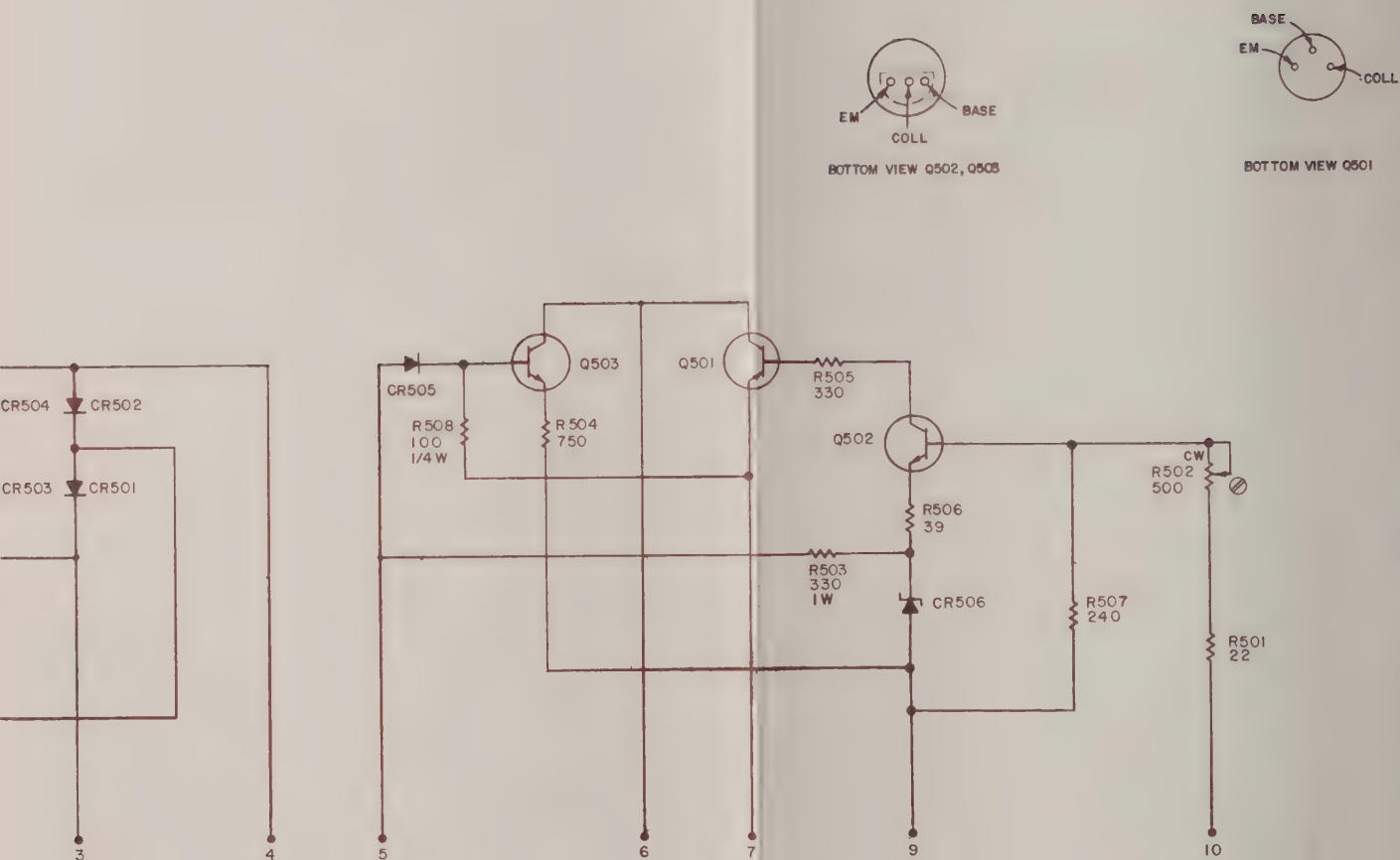
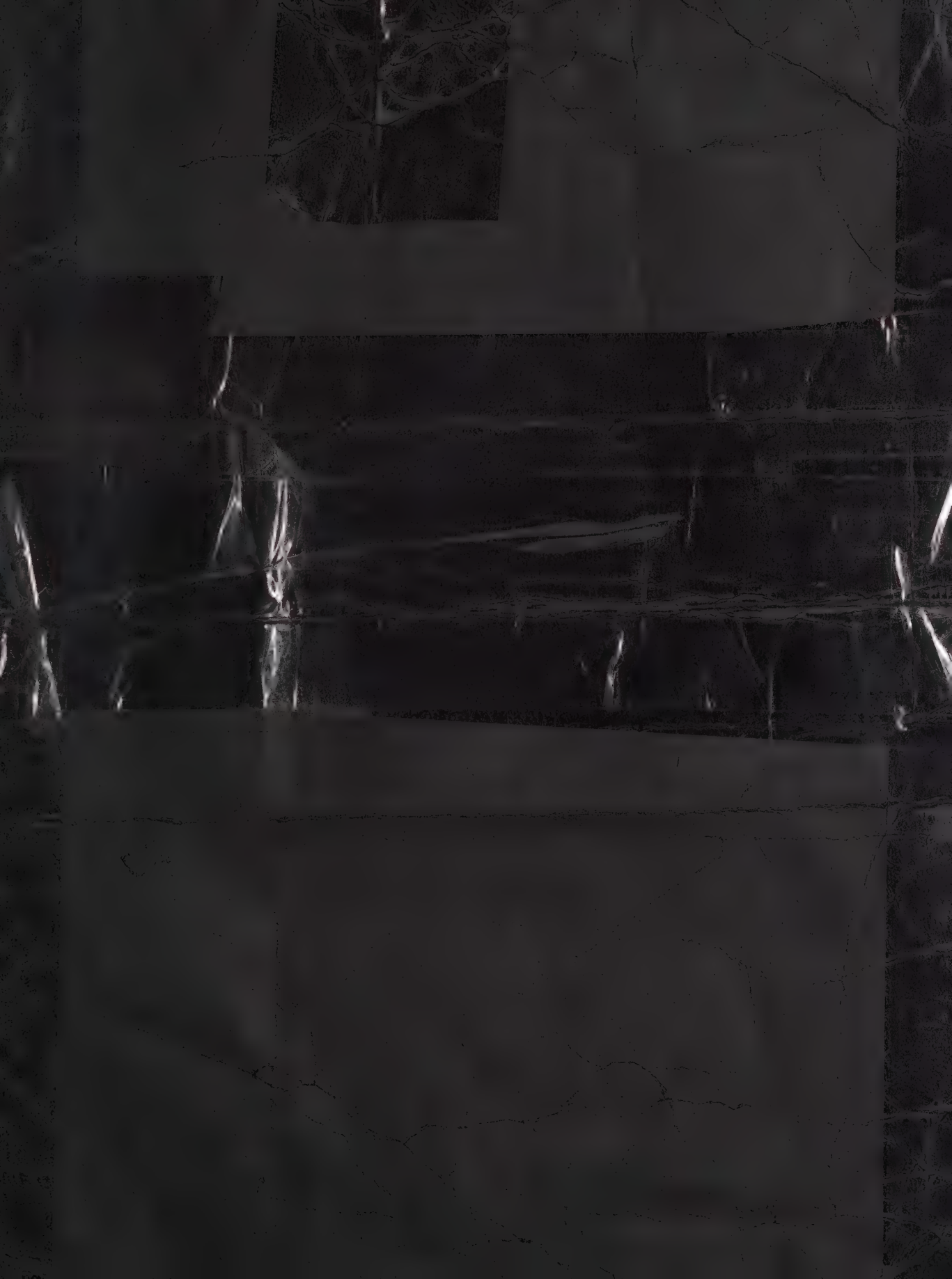


Figure 6-20. Dc power supply regulator circuit schematic diagram.



Ref. No.	Description	Part No.	Fed. Mfg. Code	Mfg. Part No.	Fed. Stock No.
C551	CAPACITOR, Ceramic, 0.1 μ F +80 -20%	4403-4100	80131	CC63, 0.1 μ F +80 -20%	5910-811-4788
CR551	DIODE, Type 1N4140	6081-1014	13327	1N4140	
CR552	DIODE, Type 1N4140	6081-1014	13327	1N4140	
CR553	DIODE, Type 1N4140	6081-1014	13327	1N4140	
CR554	DIODE, Type 1N4140	6081-1014	13327	1N4140	
CR555	DIODE, Type 1N4009	6082-1012	24446	1N4009	
CR556	DIODE, Type 1N967B	6083-1016	28959	1N967B	
Q551	TRANSISTOR, Type 2N3638	8210-1096	07263	2N3638	
Q552	TRANSISTOR, Type 2N3414	8210-1047	24446	2N3414	5961-989-2749
Q553	TRANSISTOR, Type 2N3414	8210-1047	24446	2N3414	5961-989-2749
R551	RESISTOR, Composition, 180 Ω $\pm$ 5%	6100-1185	01121	RC20GF181J	5905-279-3514
R552	RESISTOR, Pot., Wire Wound, 100 Ω $\pm$ 10%	6059-1109	80294	3067P-1-101	
R553	RESISTOR, Composition, 330 Ω $\pm$ 5%	6110-1335	01121	RC32GF331J	5905-279-2645
R554	RESISTOR, Composition, 750 Ω $\pm$ 5%	6100-1755	01121	RC20GF751J	5905-195-9481
R555	RESISTOR, Composition, 22 k Ω $\pm$ 5%	6100-3225	01121	RC20GF223J	5905-171-2004
R556	RESISTOR, Composition, 39 Ω $\pm$ 5%	6100-0395	01121	RC20GF390J	5905-195-5546
R557	RESISTOR, Composition, 51 Ω $\pm$ 5%	6100-0515	01121	RC20GF510J	5905-279-3517
R558	RESISTOR, Composition, 100 k Ω $\pm$ 10%	6099-4109	75042	BTS, 100 k Ω $\pm$ 10%	
R559	RESISTOR,	5600-1010	24655	5600-1010	

1. POSITION OF ROTARY SWITCH, SHOWN COUNTERCLOCKWISE.
2. CONTACT NUMBER EXPLAINED ON SERVICE BOOK FOR 1158-0755/2.
3. REFER TO SERVICE BOOK FOR 1158-0755/2 FOR 1158-0755/2.
4. RESISTORS 1/2 W.

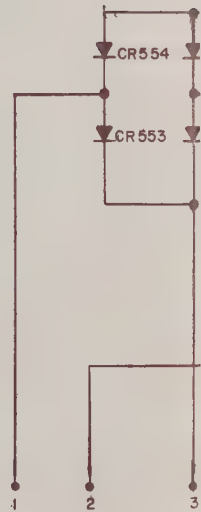
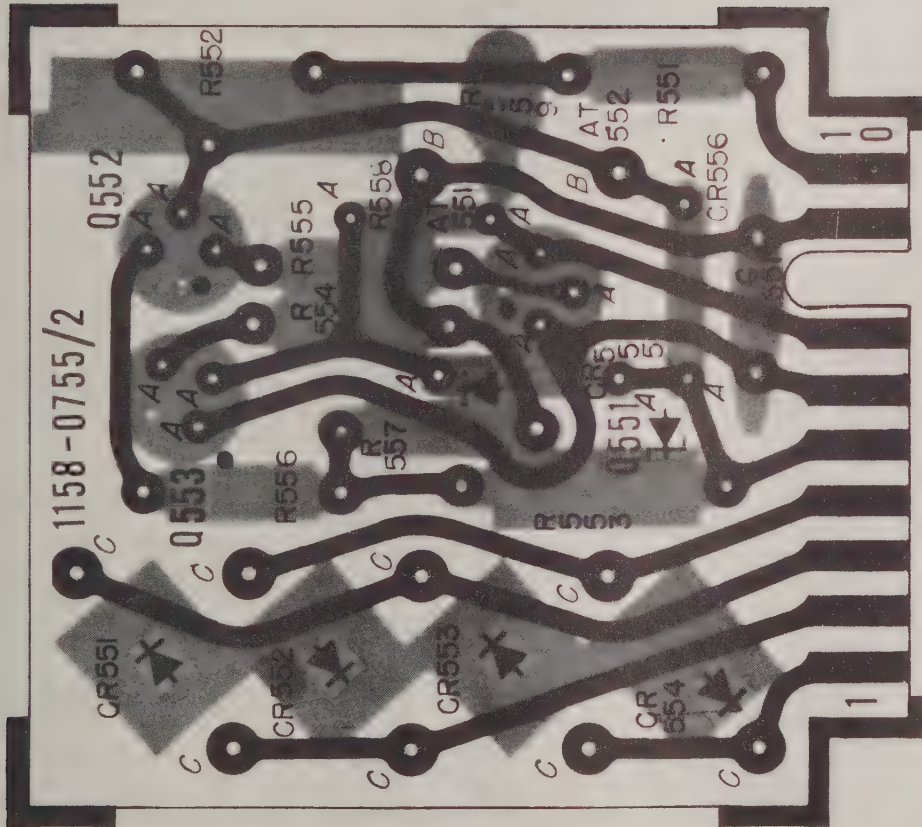


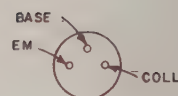
Figure 6-21. Indicator power supply regulator circuit etched-board assembly (P/N 1158-4756).

NOTE: The number appearing on the foil side is not the part number. The dot on the foil at the transistor socket indicates the collector lead.

NOTE: UNLESS SPECIFIED	
SWITCHES UNLESS OTHERWISE SPECIFIED.	5. RESISTANCE IN OHMS K - 1000 OHMS M - 1 MEGOHM
OF SWITCHES SEE SHEET FOR BOOK.	6. CAPACITANCE VALUES ONE AND OVER IN PICO FARADS, LESS THAN ONE IN MICRO FARADS.
IN INSTRUCTIONS UNLESS OTHERWISE SPECIFIED.	7.  KNOB CONTROL
	8.  SCREWDRIVER CONTROL
	9. AT - ANCHOR TERMINAL
	10. TP - TEST POINT



BOTTOM VIEW Q552, Q553



BOTTOM VIEW Q551

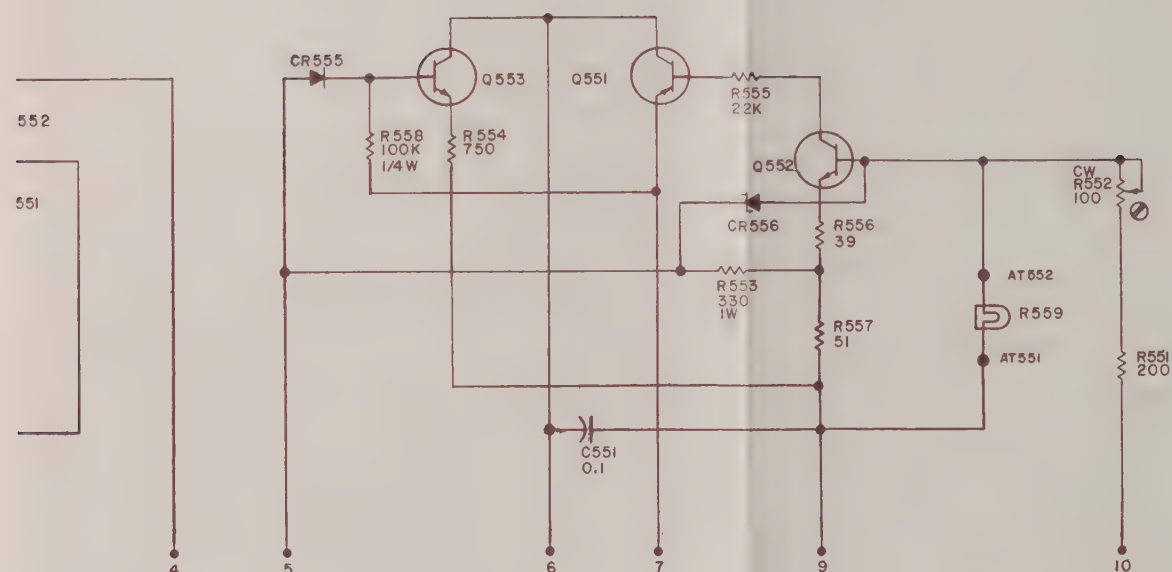


Figure 6-22. Indicator power supply regulator circuit schematic diagram.

PL-1 PIN NO	WIRE COLOR	PL-2 PIN NO
B1	WH-BK	21
D1	WH-BR	22
F1	WH-BU	46
H1	WH-GN	47
A2	WH-RD-BK	19
C2	WH-RD-BR	20
E2	WH-RD-BU	44
G2	WH-RD-GN	45
B3	WH-GY-BK	17
D3	WH-GY-BR	18
F3	WH-GY-BU	42
H3	WH-GY-GN	43
A4	WH-VT-BK	15
C4	WH-VT-BR	16
E4	WH-VT-BU	40
G4	WH-VT-GN	41
B5	WH-OR-BK	13
D5	WH-OR-BR	14
F5	WH-OR-BU	38
H5	WH-OR-GN	39
A6	WH-YE-BK	11
C6	WH-YE-BR	12
E6	WH-YE-BU	36
G6	WH-YE-GN	37
B7	WH-GY-RD-BK	9
D7	WH-GY-RD-BR	10
F7	WH-GY-RD-BU	34
H7	WH-GY-RD-GN	35
A8	WH-VT-RD-BK	7
C8	WH-VT-RD-BR	8
E8	WH-VT-RD-BU	32
G8	WH-VT-RD-GN	33
B9	WH-VT-GY-BK	5
D9	WH-VT-GY-BR	6
F9	WH-VT-GY-BU	30
H9	WH-VT-GY-GN	31
A10	WH-OR-GY-BK	3
C10	WH-OR-GY-BR	4
E10	WH-OR-GY-BU	28
G10	WH-OR-GY-GN	29
B11	WH-YE-RD-BK	1
D11	WH-YE-RD-BR	2
F11	WH-YE-RD-BU	26
H11	WH-YE-RD-GN	27
A12	WH-YE-GY-BK	23
C12	WH-YE-GY-BR	25
E12	WH-YE-GY-BU	48
G12	WH-YE-GY-GN	24
B13	WH-YE-VT-BK	49
H13	WH-YE-VT-GN	50

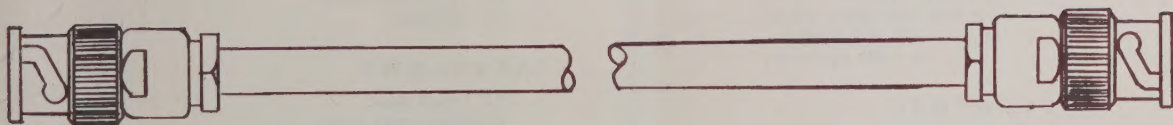


Figure 6-23. Cable assembly (P/N 8161-1600).

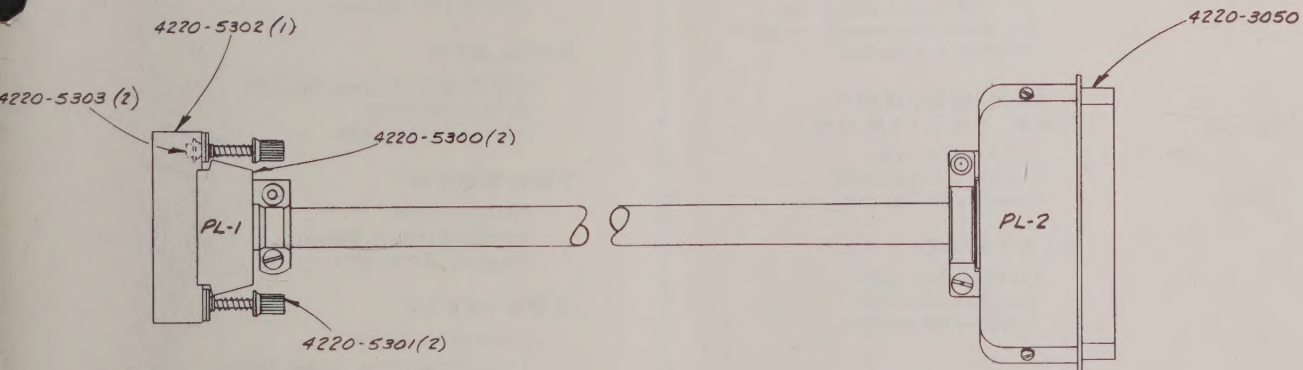


Figure 6-24. Signal cable assembly (P/N 4205-1060).

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